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McClain, Carl R.; Kuzniewski, Gregory S.

Monterey, California. Naval Postgraduate School

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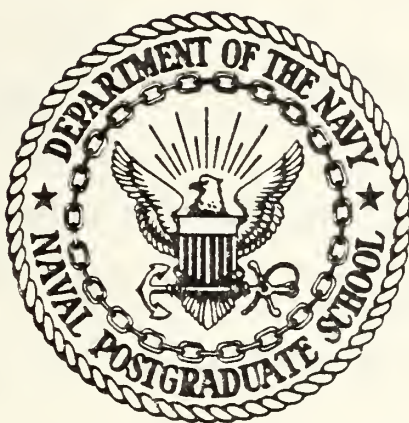
STANDARDIZATION OF NUCLEAR, BIOLOGICAL,
AND CHEMICAL (NBC) DEFENSE WITHIN
THE FLEET MARINE FORCE (FMF)

Carl R. McClain
and
Gregory S. Kuzniewski

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THESIS

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Thesis Advisor:

J. D. Buttinger

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Standardization of Nuclear, Biological, and Chemical (NBC)
Defense within the Fleet Marine Force (FMF)

by

Carl R. McClain
Major, United States Marine Corps
B.S., Northern Arizona University, 1965

and

Gregory S. Kuzniewski
Captain, United States Marine Corps
B.S., Villanova University, 1967

Submitted in partial fulfillment of the
requirements for the degree of

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from the

NAVAL POSTGRADUATE SCHOOL

September 1977

ABSTRACT

This thesis summarizes the history of NBC warfare and the NBC threat and policies exhibited by today's world powers. It analyzes the structure of NBC defense policies, training and operations within the U.S. Marine Corps. It presents a standardization proposal designed to remedy the existing incongruities and establish a viable NBC defense program for the Fleet Marine Force.

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I. NBC DEFENSE: A PERSPECTIVE FOR
TODAY'S FLEET MARINE FORCE

The United States, as a maritime nation, requires a strong naval force to ensure its position as the leading power in today's troubled world. In order to selectively project power ashore in support of National Policy, we must maintain a strong amphibious capability; this is provided by the U.S. Navy and U.S. Marine Corps team. The role of the Marine Corps in meeting our nation's future crises and conflicts is manifest in Joint Chief of Staff (JCS) contingency planning. The Marine Corps' ability to conduct operations on land, sea, and in the air, coupled with its immediate responsiveness and unique combined arms organization provides this nation's only forcible entry capability from the sea. The missions and tasks presently assigned to the Marine Corps transcend its traditional maritime role, officially recognizing its capabilities as a ready force of combined arms, highly mobile and possessing amphibious expertise.

During the decade commencing in 1962, Marine Corps operational involvement in the Republic of South Vietnam overshadowed all other events. Subsequent to withdrawal from Southeast Asia in 1972, the Marine Corps once again focused on amphibious operations. The acquisition of the first LHA amphibious assault shipping and the evolutionary refinement of sea-basing had provided an impetus for returning to the basics of amphibious operations. Although the most likely requirement for the

employment of Marine forces in the immediate future appeared to be in low-intensity wars, Marine Corps forces must be necessarily structured with sufficient flexibility and fire-power to participate effectively in mid- and high-intensity conflicts, including possible nuclear exchange.

Redirecting primary emphasis from the Pacific, joint and allied operations found the Marine Corps operating in Northern Europe with North Atlantic Treaty Organization (NATO) forces for the first time in 1972. Contingency plan requirements long assigned to the Marine Corps but heretofore conducted only on paper provided a familiarization with the terrain and weather of Norway. During 1975, a Marine Amphibious Unit (MAU) participated in Exercise "Straffe Zugel" with forces of the Federal Republic of Germany. In 1976, the question of what the proper employment of the Marine Corps should be in the NATO environment was once again raised. Should Marine Corps units be deployed in central Europe with conventional U.S. Army and NATO land forces, or should it be on the NATO flanks where Marine Corps speed and versatility can be employed? During the autumn of 1976, two joint/allied operations, "Teamwork 76" (Norway) and "Bonded Item" (Germany) were conducted to assist in resolving this dilemma. Successful performance in both operations lent credence to Marine Corps employment in the familiar coastal environment of either northern or southern Europe.

Regardless of the ultimate disposition of Fleet Marine Forces (FMF) in Europe, the foe remains the same: the Union

of Soviet Socialist Republics (U.S.S.R.) and the six additional Warsaw Pact countries. The premise that FMF conventional operations can be successfully conducted in the NATO theater is generally accepted by the military hierarchy. The introduction of enemy nuclear, biological and chemical (NBC) warfare, however, raises a serious and oft-debated question: "can the FMF operate within an NBC environment?" The consensus of Marines knowledgeable in the NBC defense field is a resounding negative; not only is Marine Corps NBC defense capability suspect, it is believed to be marginal, at best, under any NBC conditions. If this allegation is factual, the Marine Corps is placed at an extremely serious disadvantage requiring immediate correction. The Warsaw Pact forces are known to be extremely proficient in both offensive and defensive NBC operations and train against a background of nuclear and chemical war.

The intent of this thesis is to closely examine Marine Corps NBC philosophy, training, and operations, and present a program to remedy existing NBC deficiencies. It will concentrate on the establishment of a standardized NBC defense policy and training within the FMF to provide the capability for successful NBC defense and NBC operations for the FMF within an NBC environment.

II. THE NUCLEAR, BIOLOGICAL AND CHEMICAL THREAT

A. HISTORY OF NBC WARFARE

The use of NBC weapons is an effective and powerful means of conducting modern warfare. The selectivity afforded by NBC weapons greatly expands the options of warfare that have traditionally been limited to the size and strength of standing conventional forces. Possession of NBC weapons is not only viewed as critical to the guarantee of national well-being, but is deemed prestigious to a country's national and world-wide image. This is realistically reflected in the NBC arsenals of the armed forces of today's modern nations. It is commonly accepted that the advantages of NBC weapon possession far outstrip the consequences of non-possession; the large stockpiles of chemical weapons and the rush to join the "nuclear club" emphasizes this quest.

Although the earliest use of chemical and biological warfare (CBW) is unclear, it is most probable that the initial discovery of fire and its unique characteristics led to its usage in repelling unfriendly animals and destroying unwanted settlements. The first recorded history of chemical warfare (CW) is documented in the Peloponnesian War (431-404 B.C.) when the Spartans burned sulphur-soaked rags to produce noxious fumes in their wars with adjacent Greek city states. The Macedonian Army, during the campaigns of Alexander the Great (336-323 B.C.) catapulted diseased corpses over the protective

walls of besieged cities to register the first recorded use of biological warfare (BW). With these nocuous acts, CBW was conceived, and subsequent scientific discovery and ingenuity have transformed warfare over the centuries to its current advanced state.

In the United States, BW was first employed in 1763 by the British, when smallpox-infested blankets were distributed to non-immune and highly susceptible members of hostile Indian tribes during the French and Indian War. During the expansion periods of our American West, diseased animals were often deposited in water holes to restrict their use. Smoke was employed during the Civil War by Confederate blockade runners to conceal themselves from the Union Navy.

The synergistic trilogy of mass destruction, however, was born during the twilight hours of 22 April 1915 at Ypres, Belgium, amplified by two shattering nuclear blasts over Japan in August of 1945, and culminated in the development of a credible biological capability in the late 1950's. Warfare has not been, nor will it ever be, the same again.

The German action on 22 April 1915 is considered to be the genesis of modern NBC warfare. The venting of some 6,000 chlorine cylinders in the salient near Ypres, and the subsequent drift of the noxious cloud over the French and British trenches opened a four mile breach in the Allied line, causing an estimated 15,000 casualties, of which approximately 5,000 were fatal. Throughout the remainder of World War I, both factions employed a wide variety of lethal and incapacitating

chemical agents to circumvent improvements to existing chemical protective equipment. Mustard gas was first used against the British on 12 July 1917, causing 500 deaths and approximately 14,000 casualties, and was to become the single greatest casualty producer of the war. Additionally, screening smoke was used frequently and successfully on land and at sea by both the Allied and Central powers throughout the war.

Only two instances of relatively large scale chemical warfare have occurred since World War I. The first occurred during the war between Italy and Abyssinia during 1935 and 1936, when Italy effectively used mustard gas to disperse and defeat the enemy. The second use was during the first five years of the war between Japan and China (1937 to 1942). The Chinese government announced in June 1942 that no less than 1,000 gas attacks had been made by the Japanese against Chinese troops in the previous five years of war. All were small scale attacks and no critical appraisal of the effectiveness of these attacks has ever been made.

The Germans discovered a new toxic chemical agent, tabun, in 1936, which was the first of the nerve agents. The nerve agent family is odorless, tasteless, and colorless, and consequently impossible to detect with unaided senses. Entering the body through the eyes, skin, or respiratory tract, they act immediately, causing paralysis, prostration, and death, even in minute quantities. Still acknowledged as the most lethal of toxic chemical agents, for unknown reasons they were never employed by the Germans. Possessing unparalleled

potential, it is quite fortunate for the Allies that Germany did not exploit her advantage, particularly in light of the effect a nerve agent attack might have had in Normandy on D-Day.

During World War II, the use of flames, incendiaries, and smoke fulfilled the CW needs necessary to accomplish national objectives. Similar usage during the Korean conflict and the recent engagement in Southeast Asia saw no expansion of CW, with the exception of limited riot control agent (RCA) and defoliant (herbicides) employment.

Scientists and military personnel maintained a general interest in the application of BW, and this interest eventually led to every major power possessing the technology and resources to wage BW effectively by the 1950's.

The development of nuclear weapons provided the most destructive and lethal weapons yet conceived by man. The complete destruction of a large industrial city and a major portion of its population by a single nuclear bomb is still a feat to stagger the imagination. Yet, since the development of the first nuclear weapon, an astronomical increase in individual weapon yield has been realized. With strategic nuclear warheads ranging up to 25 megatons, the approximate 13 kiloton yield of the Hiroshima bomb appears miniscule indeed. Tactical nuclear weapons and warheads currently number in the tens of thousands. Five nations presently possess a nuclear warfare capability. They are, by date of achievement, the United States (1945), the Union of Soviet Socialist Republics (1949),

Great Britain (1952), France (1960), and the Peoples' Republic of China (1964). India detonated a nuclear explosive in 1974, but is not believed to possess any nuclear warheads. The recent distribution of nuclear reactors has placed numerous nations within the immediate grasp of achieving a nuclear capability. Looking to the immediate future, it is conceivable that between 20 to 30 countries could possess tactical nuclear weapons by the mid-1980's.

B. NUCLEAR, BIOLOGICAL, AND CHEMICAL POLICY

A review of international, Soviet, and United States NBC policies will provide an insight to the major nationalistic approaches to non-conventional warfare.

1. International Policy

The Geneva Protocol of 1925 prohibits the use in war of chemical and biological (CB) weapons. This has been the definitive document on the control of chemical and biological warfare. The Geneva Protocol did not, however, prohibit development and stockpiling of CB weapons. Although the United States never ratified the signing of the agreement, it supported its intent in prohibiting the use in war of asphyxiating, poisonous, or other gases and of bacteriological warfare. The treaty was originally signed by representatives of 38 nations on 17 June 1925, and a total of 84 nations are parties to the treaty today. The United Nations Convention of 26 March 1975, however, does prohibit the development, stockpiling, and weaponization of biological warfare agents.

These prohibitions do not affect the use of research quantities of these agents for maintaining an effective CBW protective posture.

2. U.S.S.R. Policy

It is the accepted opinion among experts that Soviet doctrine is to employ chemical weapons in tactical operations, biological weapons in strategic operations, and nuclear weapons as required. The Soviets consider CW as an integral part of their overall offensive capability and chemical munitions are available for these existing weapon systems: tactical missiles, aircraft, surface-to-surface rockets, mortars, artillery, generators, and mines. It is commonly accepted that if hostilities were to erupt with the Soviets, they would willingly employ offensive chemical weapons, which would most probably be complicated by the use of both biological and nuclear weapons.

The U.S.S.R. acceded to the 1925 Geneva Protocol for the prohibition of wartime use of CBW agents with the reservation that they would not be prohibited from CBW agent employment against non-parties of the Protocol, violators of the Protocol, or allies of the violators. As a result, the U.S.S.R. was legally prohibited from the use of CBW agents in certain instances but not from production or possession, a point which was and continues to be repeatedly stressed in the Soviet press.

The Soviets also have vociferously condemned those countries which in the past have resorted to CBW, and their

sustained propaganda effort in this area can be assumed an indicator of their considerable interest regarding CBW.

On the nuclear side, the fundamental premise of current Soviet military doctrine envisages a strategic package consisting of a superior first-strike counterforce capability and effective attack and passive defenses to deal with retaliatory attacks of the enemy's surviving strategic forces, thus ensuring the complete defeat of any aggressor.¹ The Soviet position is that an effective, war-fighting, war-survival, and war-winning capability also provides the most credible form of deterrence. Military superiority is needed to attain Soviet foreign policy objectives without war with the West. Their doctrine emphasizes the primacy of the offensive and enhanced importance of surprise in any future war. Surprise is required for military success, and a pre-emptive strike is of great strategic significance in assuring the viability of the state.

The Soviets have a viable and effective CW defensive policy that encompasses not only the military but their civilian populace as well. Civil defense (CD) training is conducted by their CD organization and entails 22 hours of instruction plus practical exercises. Unlike American CD, Soviet CD training is mandatory for all adults between the ages of 16 and 60.

¹ Goure, L., "Soviet Military Doctrine," Air Force Magazine, v. 60, n. 3, p. 47-50, March 1977.

3. U.S. Policy

On 25 November 1969, then President Richard M. Nixon set forth the U.S. policy on CW of "no-first-use" of lethal chemical weapons and extended this policy to include incapacitating chemical agents as well. He also renounced all methods of biological warfare and later extended this to include toxins. The U.S. has always adhered to the principles set forth in the Geneva Protocol and had earlier renounced all forms of biological warfare. It has reportedly destroyed all of its BW stockpiles and has limited its research and development (R&D) to a defensive status. However, the U.S., among other nations, has found that her vital national interests require that she enter reservations to the Geneva Protocol preserving the right to retaliate with chemical weapons to a chemical attack. Thus, the Geneva Protocol actually prohibits only the "first-use" of the weapons it covers.

The overall object of the U.S. chemical policy is to deter the use of chemical weapons by other nations and to possess the capability to retaliate with chemical weapons should deterrence fail. In the past, the use of chemical weapons in war has been restrained by the threat of retaliation in kind, and the U.S. believes that such a retaliatory capability continues to serve as a deterrent today. The present emphasis of the U.S. R&D program is to provide the capability to warn of, withstand, and recover from the effects of a chemical attack against U.S. forces. Some strategists have suggested that the U.S. abandon its retaliatory capability

and adopt a defensive only posture, relying upon its nuclear deterrent to deter any chemical attack as well. This reliance would risk lowering the nuclear threshold by denying an option which falls between conventional munitions and escalation to tactical nuclear weapons.

Present U.S. chemical programs are largely under single component management by the U.S. Army, supported by liaison offices of the U.S. Air Force and U.S. Navy to meet their specific requirements. The biological research program is a totally defensive effort oriented primarily toward medical research for the development of vaccines, prophylactic and therapeutic drugs, and other protective measures. Biological detection and warning systems are being developed to alert U.S. forces when such an attack occurs so proper protective measures may be taken.

Authority for U.S. forces to engage in or retaliate with lethal or incapacitating chemical and/or nuclear weapons emanates from the President. This constraint, coupled with total renunciation of biological warfare, the "no-first-use" U.S. policy, and the parity of the U.S.S.R. in nuclear weapons has made defense through deterrence no longer a credible option.

C. U.S.S.R. AND THE WARSAW PACT COUNTRIES

1. History

The history of the development of Soviet CBW capabilities has been shrouded in secrecy and obscured by the passage of time. The Soviets have, however, published

information concerning concepts, organization, training and material for BW defense and protection. Little definitive information is available concerning CBW development within the Soviet Union, and that available is predominantly of a classified nature.

In May 1915, the Germans launched a chlorine attack against Russian soldiers approximately 50 kilometers from Warsaw, Poland. The Russians reportedly suffered 9,000 casualties, and Russian susceptibility to chemical attack continued throughout the war. The Russians suffered greater CW casualties than any of the other belligerents, and this was attributed to their poor "gas discipline," as they possessed effective protective equipment. As a direct result of their disastrous initial CW encounters, the Russians apparently resolved to never again be placed in a similar position of inadequacy. In 1925, the Soviets began construction of a CBW proving ground at Tomka, where a highly classified joint program with Germany was conducted from 1928 to 1933, at which date the Soviets alone continued their research. The period from 1918 to 1945 was characterized by construction of production facilities for CBW agents and protective material. By the end of World War II, Soviet technology had advanced to such a state that Soviet forces were judged sufficiently equipped and trained to wage large-scale CBW. Subsequent CBW agent and weapon development continued with renewed vigor, as the lack of a nuclear capability immediately following the war provided a strong incentive to develop CBW as an alternative

while pursuing their nuclear program, which was realized in 1949.

The Soviet Armed Forces consists of five Soviet Ministry of Defense combat services; they are (with the latest manpower analysis estimate): Strategic Rocket Forces (375,000), Ground Forces (1,825,000), Air Defense Forces (550,000), Air Forces (490,000), and Navy (370,000). The Ministry of Defense, Headquarters Staff, and various support troops total approximately 800,000, and Border Troops and Internal Security Troops total 400,000 for an estimated total of 4,810,000 personnel. Detailed comparison of U.S. and Soviet military manpower is difficult due to our limited knowledge of many aspects of the Soviet program. It is known that Soviet military forces are used for such tasks as railroad repair, crop harvesting, and construction. They apparently have proportionately fewer civilians in their defense establishment, and many more military directly involved in operating research and development and production facilities. Their border and internal security forces are not available for use outside the Soviet Union.

The U.S.S.R. and the Warsaw Pact countries (Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, and Rumania) rely upon conscription to provide the bulk of their manpower. According to the latest information published by the International Institute for Strategic Studies, the Warsaw Pact armies have a combined strength of 2,626,000 men, of whom some 900,000 are infantry. These figures do not take account of Russia's 20,000 strong marine corps, of whom about



half could be considered as infantry. Poland also has a 1,000 man force of marines. As a comparison, the member states of NATO and France have nearly 3,500,000 men in their ground forces. Within Europe, however, the picture is presently one of Warsaw Pact superiority.²

2. CBW

Soviet CBW training is realistic, well-structured and stresses individual and unit technical proficiency. All personnel are taught individual protective measures (i.e., gas mask, cape, and chemical agent identification kit use) and disciplined to function for extended periods of time within an NBC environment. Soviet Chemical Specialists currently number over 80,000 and are trained in curricula lasting from nine months to two years; officers reportedly receive even more comprehensive training. Current Soviet CW training emphasizes gas chamber exercises (GCX), replacement of defective mask components in a contaminated atmosphere, and training exercises with live, toxic chemical agents.

The Soviets, unlike the United States, have a large and well-trained chemical organization. Chemical functions within the Soviet Army are performed by separate chemical units, which is in direct contrast to the U.S. Army and U.S. Marine Corps "functionalized" concept. Every Soviet division has a unit devoted exclusively to CW and chemical troops are

² Owen, J. I. H., Major General, OBE, Warsaw Pact Infantry and Its Weapons, p. 5, Western Press, 1976.

assigned down to regimental level. Chemical personnel are well-versed in chemical detection, identification, decontamination procedures, and reconnaissance. By all indications, the Soviets are very well prepared to use and defend against CBW agents and weapons. The large quantities of Soviet CW equipment captured during the 1973 Middle East War support the supposition that they pose a serious CW threat.

The Soviet/Warsaw Pact forces continue to maintain a superior capability to operate in toxic environments. They are the best-equipped and prepared forces in the world to employ chemical weapons and to operate under chemical, biological, and radiological (CBR) warfare conditions. Soviet doctrine envisions CW employment in conjunction with either conventional or nuclear weapons. Soviet front line commanders have the capability to use CBW on a first strike basis against NATO forces, and are increasing the number of combat and combat support vehicles integrated with CBR collective protection systems. Interwoven throughout the formidable Soviet effort is the tenet that a viable CBR protective posture is prerequisite to NBC weapon employment. Additionally, all medical support units train to care for the mass casualties expected from NBC warfare.

Soviet leaders are currently pursuing a total ban on the development, production, and stockpiling of chemical weapons, but their military CW efforts continue unabated. There is absolutely no evidence to suggest any lessening in their effort to improve CBW training areas and equipment,

and new developments in CBR equipments are fielded at an alarming rate.

3. The Soviet Nuclear Threat

The presence of both the constructive and destructive capabilities of nuclear forces has created new concepts of warfare due to the peculiarities of nuclear weapon characteristics and effects. Problem areas arise in defensive measures, dispersion of tactical and supporting units, decontamination, initial and residual radiation hazards, and massive medical requirements. Offensively, to minimize casualties and preclude unnecessary damage, extensive communications, coordination, control and planning are required. The evolution of nuclear weaponry has provided increasingly complex and infinitely more devastating warheads to complement technological advances in the fields of miniaturization, missilery, and air/ground/sea delivery systems.

The nuclear arsenals of both the U.S. and U.S.S.R. include warheads with yields ranging from a decimal percentage of a kiloton up to 25 megatons. The most recent analysis of U.S./U.S.S.R. comparative nuclear might disclosed that the U.S. leads the U.S.S.R. in strategic nuclear warheads by 8,350 to 3,250 but the U.S.S.R. has a 20 percent edge in the number of delivery vehicles and planes. The U.S.S.R. also outweighs the U.S. in throw-weight by 3,735 to 1,930 megatons and in the total destructive force of Soviet missile-borne nuclear devices.³

³ The International Institute for Strategic Studies, The Military Balance, 1976-1977, paper quoted by The Monterey Peninsula Herald, p. 1, 4 September 1976.

America's monopoly of nuclear weapons ended in 1949 with the first Soviet nuclear detonation. The period of nuclear monopoly (1945-1953) by the U.S. provided a deterrent to a possible Soviet attack on Western Europe during this period. From 1954 to 1960, the American threat of massive retaliation provided an explicit strategy of deterrence aimed at both local and limited as well as general wars. The U.S. military was directed by the Executive Branch to plan to use nuclear weapons whenever their use was militarily desirable. By being able to employ nuclear weapons of a wide range of magnitude in a wide range of situations, U.S. armed forces would not need to demand large masses of manpower or immense varieties of conventional arms, thus reducing defense expenditures. Only when the Soviets achieved significant missile successes in the fall of 1957 with the first Sputnik launch was an awareness of their capabilities brought to the attention of the American public. In 1958, suspicion of a so-called "missile gap" between the U.S. and U.S.S.R. accelerated production of U.S. warheads and placed the U.S. in an even stronger role due to the error in the prediction of actual Soviet gains. With President Kennedy's election in 1960, the transition from a strategy of massive retaliation to that of flexible response began. Along with Secretary of Defense McNamara and his staff of controversial "whiz kids," President Kennedy effectively confronted the Soviets during their ill-fated attempt to emplace Soviet intermediate range ballistic missiles (IRBMs) in Cuba during the Cuban Missile Crisis

of 1961. The much-debated missile gap mysteriously evaporated with reassessment of the relative nuclear strength of the two superpowers. Russia increased their nuclear warhead production to ensure that they would be able to deal from a position of strength in any future confrontation with the U.S. A noticeable shift from the U.S. doctrine of nuclear superiority was necessitated by the realization that the U.S. would be unable to destroy Russia's second strike force to such an extent that the U.S. would be able to escape damage in a nuclear war. It became apparent that even though the U.S. enjoyed a meaningful strategic nuclear superiority, Soviet expansion would lead to corresponding U.S. endeavors to maintain a continued lead.

With President Nixon's administration, the current U.S. strategic goal of sufficiency and its military strategy of realistic deterrence began. The Strategic Arms Limitation Talks (SALT I, 1969-1972, and SALT II, 1972-1974) culminated in the Vladivostock Accord of 24 November 1974, which is to cover arms controls during the period from October 1977 through 31 December 1985. This strategy was forced by the achievement of the Soviets in overcoming the once superior intercontinental ballistic missile (ICBM) force and matching technology in sea-launched ballistic missiles (SLBMs). The current Soviet strategic threat is well documented and a source of constant concern for all mankind.

The current policy of U.S./U.S.S.R. detente has served well the Soviet cause, enabling them to pursue their objective of a massive ICBM fleet which presently numbers over 1500

missiles, constantly undergoing further modernization at a furious rate. Soviet missile silos are also being hardened to about 3,000 psi, more than twice the hardness of new U.S. Minuteman III silos. Approximately 85 percent of the Soviet defense budget in the past decade has gone to forces which constitute a direct threat to the U.S. and its European allies; that is, strategic nuclear forces and the forces deployed opposite NATO.⁴ At the present time, given existing Soviet ICBM accuracy, more than three-quarters of the USAF's ICBMs would survive a Soviet sneak attack. It is hypothesized that by the mid 1980's, that fraction might be down to as few as one-fourth, according to USAF Secretary Reed.

The possession and distribution of tactical nuclear weapons within both U.S. and U.S.S.R. armed forces is an integral part of each nation's capability to wage nuclear warfare. The propensity to employ tactical nuclear weapons carries the risk of escalation towards a strategic encounter, and creates the most serious disadvantage to tactical nuclear weapon employment. This controversial aspect could lead to tactical nuclear weapon restraint, which would in all probability prove detrimental to the defense of numerically inferior conventional forces, specifically NATO forces in Central Europe, who are opposed by superior Soviet firepower, manpower, and mobility.

⁴ Ulsamer, E., "The U.S.S.R.'s Military Shadow is Lengthening," Air Force Magazine, v. 60, n. 3, p. 37, March 1977.

SALT negotiations covering the questions of further limitations and reduction of strategic arms in the period after 1985 will be confronted by such developments as the neutron bomb, the cruise missile, and mobile ICBMs, of which the latter two both offer a viable, land-based alternative to more expensive and vulnerable fixed missile silos. Meanwhile, the production of both strategic and tactical nuclear warheads and weapons continues on both sides. The threat of a potential nuclear exchange has led to wide concern regarding the control of nuclear weapons. Alistair Cooke philosophized, "The greatest danger is that the technology of the unthinkable war will enchant its practitioners, growing so subtle and mighty as to acquire a momentum all of its own, which mere men will be powerless to subdue."⁵

4. Civil Defense

The Soviets accuse the West of denying the feasibility of victory in a nuclear war, and view this outlook as erroneous and harmful. The Soviet view of the relationship between strategic offensive and defensive systems is that while the Soviet Armed Forces destroy or intercept attack weapons, Civil Defense, by carrying out protective measures and the thorough preparation of the Soviet population will achieve the maximum weakening of the destructive effects of modern weapons.

The Soviet CD program threatens to destabilize existing U.S.-U.S.S.R. strategic relationships for the following reasons:

⁵ Cooke, A., Alistair Cooke's America, p. 363, Knopf, 1973.

a. Russia may perceive an ability to absorb at a limited cost a retaliatory U.S. strike. The stability that now exists may be undermined as Russia decides she can afford to fire the first salvo.

b. Russia can absorb a U.S. first strike, when and if the U.S. renounces its existing policy of "no-first-strike."

The current permanent Russian CD program staff numbers 72,000 members, the majority of whom are military personnel. The 15 Soviet Republics are assigned CD commanders holding the rank of either major or lieutenant general. Active duty officers also command the approximately 120 government CD centers that comprise the 15 Republic CD regions. The permanent CD staff is to be augmented by the 500,000 member Soviet police force in the event of national crisis.

Russian CD preparation begins with urban planning. Building density has been reduced via dispersion to improve overall national industry survivability. These urban plans provide for green belts and wide thoroughfares to serve as firebreaks and immediate clearing of radiation-free passages following a nuclear exchange. This would immediately reduce the hazard of induced radiation to the wholesale evacuation of protected personnel surviving the holocaust. The Russian plan provides urban assembly areas for each 2,000 to 3,000 urban dwellers. These assembly areas are also permanently staffed; when an evacuation is ordered, movement to the assembly area is followed by convoy, train, or water transportation to an evacuation area (with some transportation being

accomplished by marching, if the distance is reasonable). The evacuation areas are located on collective farms, all of which are prepared for the evacuees by number and even by name. Construction of simple shelters will be commenced immediately, which is anticipated to require about 11 hours to construct a 10-man shelter with a blast resistance of 30 to 50 psi and a radiation protection factor of about 1,000 radiation absorbed dose (rad). Recent intelligence indicates that the Soviet CD troops are listed on a par with the other five Soviet military services which provides an insight as to their national policy towards the overall CD posture and its role in strategic strategy and planning.

U.S. calculations of Soviet fatalities in a strategic exchange are based on an assumption that Russian citizens will occupy their urban areas at the time of the exchange. This, obviously, is not the Russian plan; they intend to evacuate and disperse prior to the onset of hostilities, implying that the Soviet government may have an idea of when the hostilities will commence.

D. THE PEOPLES' REPUBLIC OF CHINA

General information concerning the Peoples' Republic of China (PRC) is scarce and military information of any consequence is very broad, often vague, and usually classified. Consequently, the majority of information currently available is mainly supposition and subject to debate. As a result of this void, the appraisal of the threat and capabilities of the PRC is primarily the opinion of the authors and is considered secondary as compared to the Soviet threat.

Due to a shortage of qualified scientists and technicians and a limited research and development program, the evolution of the PRC NBC offensive and defensive structure is based on the interchange of technology prior to the Sino-Soviet split. Driven by their national goal of the attainment of world power status and witnessing the Soviet advances and emphasis in the NBC field, the PRC intensified their NBC programs. This has been accomplished as a result of their exploitation of foreign scientific and technological advances.

All evidence indicates that the Chinese NBC employment doctrine is quite similar to Soviet doctrine in both offensive and defensive operations. The primary emphasis appears to be oriented to such defensive aspects as CW reconnaissance, rapid detection, and agent identification. The PRC has developed a credible IRBM force with a regional nuclear strike capability; at this time it is estimated that between 60 and 70 IRBMs are capable of striking well into U.S.S.R. territory from their western China locations.

It is important to note that the PRC is a non-signatory to both the 1925 Geneva Protocol and the 1972 Biological Warfare Convention. While both the U.S. and U.S.S.R., as signees, could be reducing or terminating CBW production, the PRC could be continuing research, development and production of CBW weapons. The present PRC posture indicates that their main interest lies in the role of deterrence and defense against the Soviets. This should not be construed to negate any possible threat to the continental U.S., but only that the threat is not yet immediate.

III. U.S. ARMY TRAINING EFFECTIVENESS ANALYSIS

A. BACKGROUND

United States Armed Forces doctrine has established that the Department of the Army (DA) is totally responsible for the CW munitions, agents, and CB defensive items that meet joint requirements of both the U.S. Army and either the U.S. Navy or the U.S. Air Force, or both. The U.S. Army is charged with the primary responsibilities on land except for those functions otherwise assigned by the JCS. The Marine Corps, on the other hand, is responsible for CW and biological defense operations related only to its assigned functions, including defense against enemy CB weapons.

Due to the U.S. Army's major role in NBC defense, the Marine Corps relies heavily upon the doctrines, equipment, and training devices developed by the U.S. Army Chemical Corps. As a result of this near total reliance, it is postulated that any analysis or study completed by the U.S. Army Training and Doctrine Command (TRADOC) in the field of NBC defense is directly applicable, either in whole or in part, to the Marine Corps.

The U.S. Army Ordnance Center and School (USAOC&S), Aberdeen, Maryland, has recently completed a study examining the effectiveness of unit NBC defense officer and NCO training and the current capabilities of NBC personnel to adequately perform their additional duty NBC assignments. Their analysis

was supported by field testing at 12 CONUS U.S. Army NBC schools, with their primary intent being to determine the skill levels and current NBC knowledge retained by previously trained NBC personnel. It was noted that NBC training effectiveness at the company level is directly related to command acceptance and support for unit NBC defense training and to the effectiveness of training provided to unit NBC defense officers and NCO's. A lack of command interest and less than optimum NBC training emphasis will result in poor unit NBC readiness and a much reduced posture for unit mission accomplishment within an NBC environment. The best trained unit NBC personnel will be ineffective without this acceptance and support. To further emphasize the need for training, personnel were tested who had completed an area NBC school course within the previous six months and who had not participated in or conducted proficiency tests. Final test results disclosed a failure rate of 70 percent. This is contrasted with the testing of personnel who had accomplished this training during the same period after completing school, resulting in only approximately 30 percent failures.⁶ These astonishing test results and corresponding effectiveness levels prompted the U.S. Army to delve into and to examine the entire spectrum of their NBC defense program.

⁶ United States Army Ordnance Center and School, Training Effectiveness Analysis - Unit NBC Defense Officer/NCO Training, 19 August 1976.

The training effectiveness analysis is extremely comprehensive, covering practically every facet of applicability within the U.S. Army. Only those sections of the report which exhibited a direct correlation to the Marine Corps NBC program were explored.

B. SUMMARY OF THE TRAINING EFFECTIVENESS ANALYSIS PLAN

1. Problem

Recent training surveys have indicated that current defense readiness in U.S. Army units is extremely poor. The desired effectiveness of NBC training at the company level is directly related to the effectiveness of training provided to unit NBC officers and NCO's by NBC schools. Therefore, an analysis had to be completed to determine the manner in which to obtain the maximum benefit from the training investment.

2. Impact of the Problem

The military preparedness of the U.S.S.R. and the Warsaw Pact countries is such that the United States will not be able to afford the luxury of anything less than maximum NBC defense proficiency in Army units. Therefore, any NBC training less than optimum will result in wasted resources and degraded unit readiness.

3. Objectives

a. Define the required level of NBC proficiency required of school trained NBC officers and NCO's.

b. Determine the requirements for changes and standardization to Programs of Instruction (POI) of area NBC schools.

c. Determine the most effective method of instruction for teaching unit NBC officers and NCO's.

d. Determine the optimum usage of training simulators and devices.

e. Develop alternative training readiness recommendations.

f. Analyze and compare effectiveness and cost of current and alternative training recommendations.

g. Determine if periodic refresher training for graduates of NBC schools is required.

4. Scope

Training methods, techniques, and results of NBC training received by unit NBC officers and NCO's will be studied. Current training practices, constraints, and philosophy will be examined in an attempt to identify areas where innovative training techniques can produce results which enhance unit proficiency in NBC defense.

5. Limits

a. The analysis will be limited to examination of the training for which the USAOC&S is proponent.

b. The analysis will not include those aspects of NBC defense training for individual, team, and unit proficiency, except as they impact on the training requirements for unit NBC officers and NCO's.

c. Factors which impact on the employment and use of NBC weapons systems will not be considered in the analysis.

6. Assumptions

a. Current fiscal constraints will continue and will require even greater effectiveness from training resources.

b. The international political environment will remain such that NBC defense in the U.S. Army will continue to be essential.

c. Unit training programs will continue to emphasize NBC defense training and properly utilize school trained officers and NCO's for maintaining unit proficiency in this area.

7. Essential Elements of Analysis

a. Based on current standards, what skills are necessary for the unit NBC officers and NCO's to achieve?

b. Is the present POI for area NBC schools adequate to achieve intended results?

c. What is the most effective method to conduct unit NBC officer and NCO training?

d. How can currently available training simulators, aids, and simulant agents be most effectively used by NBC officers and NCO's?

e. What is the current effectiveness of the NBC school trained unit NBC officers and NCO's for implementing NBC training in the unit?

f. Is periodic refresher training for unit NBC officers and NCO's necessary, and if so, what is the optimum frequency and subject matter for this training?

g. What are the factors that affect the mission accomplishment of the area NBC schools, i.e., staffing, facilities, and equipment?

8. Constraints

a. The recommended training changes must be training and cost effective.

b. The analysis will be conducted and funded with existing TRADOC resources.

9. Basic Alternatives

a. Do not make any changes to existing training.

b. Only make moderate modifications of existing training.

c. Make a complete revision of existing training.

10. Measures of Training Effectiveness (MOTE)

The MOTTE will be the identification and knowledge of the critical tasks and skills that must be performed by school trained personnel that will enable them to perform their duties in support of the commander's responsibilities.

C. FINDINGS OF THE EVALUATION TEAM

1. Since the functions of NBC defense officers and NCO's in the majority of units are performed as an additional duty, the personnel serving in these adjunct positions must develop the skills required to function in this capacity in addition to the skills of their primary duty assignment. In order to determine what the graduate of an area NBC school was expected to do and know, a job analysis was conducted. This resulted in a skill/task inventory (Appendix A) which when once mastered

would enable the NBC defense personnel to perform their duties in support of the commander's responsibilities. A new POI was proposed and designed to afford unit NBC personnel optimum training and less time lost to mission training.

2. The current area NBC school POI's require revision to ensure that the essential skills and tasks are taught to unit NBC defense officers and NCO's. The two alternatives considered were:

a. Use the present POI.

b. Reduce the course length by 30 percent in conjunction with a new POI.

An experimental group of 35 enlisted and 20 officers was tested by written examination at the completion of the reduced block of instruction. The percentage of individuals correctly responding to each question was recorded and then compared with historical data from the same written examination (Tables I and II). A statistical analysis (Appendix B) was then completed and it was found that the means of both sets of test scores were equal. It was therefore concluded that a reduction in the course of instruction by 30% (from 10 to 7 instructional days) and a similar reduction in cost (Appendix C) can be effected with no significant degradation in training effectiveness through the adoption of the proposed alternative.

3. The effective use of training simulators, aids, and simulant agents can only be accomplished through careful planning on the part of the unit NBC officer and NCO. This planning and use will result in helping the commander fulfill

his responsibility for ensuring that his unit and its personnel can meet the objectives of surviving an NBC attack, operating in an NBC environment, and maintaining maximum mission effectiveness.

4. It was determined by the evaluation team that based on testing of a limited population (205 officers and enlisted men) the graduates of area NBC schools, as a group, do not retain a level of competence necessary for accomplishing their additional duty assignments in their units (60% of this sample group failed the proficiency test). This is directly correlated with the elapsed time after completing an area NBC school in conjunction with the lack of opportunity to exercise those skills acquired.

5. Tabulated test score data shows that the majority of area NBC school graduates achieve grades of 80% or better. This would tend to indicate that these graduates would be capable of performing the associated NBC duties in their units. Questionnaires indicated that 83% of the graduates had absolutely no refresher training, 58% reported that their unit gave little or no emphasis to NBC training, 84% had not given or participated in an NBC proficiency test, and only 8% of the units strongly emphasized NBC training.

NBC written test results correlated with unit NBC training emphasis plotted against elapsed time (Appendix D) showed once again that the emphasis placed on NBC training at the company level is directly proportional to the proficiency retained by unit NBC defense officers and NCO's in a given

skill area. The commander must ensure that unit NBC personnel retain their training and operational qualifications. This can be most efficiently accomplished by having NBC school trained personnel undergo refresher training in the technical aspects of NBC defense between four to six months after completing a prescribed course of instruction.

6. The overall effectiveness of area NBC schools is directly proportional to the guidance and staff support given to the school by the intermediate supervisory elements of the command element under which it functions. Lack of training facilities, equipment shortages, and inadequate staffing of area NBC schools are all related factors that impact on the overall effectiveness of the training received by unit NBC defense personnel and their ability for improving unit NBC defense readiness.

D. CRITIQUE AND APPLICABILITY TO THE U.S. MARINE CORPS

The analysis uncovered a very real and potentially dangerous situation. The United States is not prepared to operate according to satisfactory standards in an NBC environment. Commanders are failing to exercise their responsibility for NBC defense readiness and the effects are being demonstrated in the performance of their men. The analysis shows in a direct manner that the current system is weak and in need of change, direction, and command attention. The U.S. Army is the "leader" in the field of NBC defense. Where does this leave the Marine Corps? The structure, training, organization and evaluation of the Marine Corps' NBC program is presented in subsequent chapters.

<u>Question</u>	<u>Historical</u>	<u>Experimental</u>	<u>Difference</u>
1	70	71	+ 1
2	79	48	-31
3	49	60	+11
4	42	48	+ 6
5	65	58	- 7
6	95	94	- 1
7	95	97	+ 2
8	90	83	- 7
9	100	100	0
10	95	97	+ 2
11	95	94	- 1
12	92	91	- 1
13	77	80	+ 3
14	98	100	+ 2
15	95	94	- 1
16	95	94	- 1
17	95	82	-13
18	87	68	-19
19	84	63	-21
20	75	72	- 3
21	85	83	- 2
22	100	97	- 3
23	80	69	-11
24	95	100	+ 5
25	91	95	+ 4
26	100	89	-11
27	99	100	+ 1
28	49	47	- 2
29	84	92	+ 8

Table I - Enlisted NBC Test Scores

<u>Question</u>	<u>Historical</u>	<u>Experimental</u>	<u>Difference</u>
1	75	62	-13
2	89	67	-22
3	95	95	0
4	100	95	- 5
5	100	100	0
6	98	100	+ 2
7	100	95	- 5
8	100	100	0
9	98	90	- 8
10	95	100	+ 5
11	90	91	+ 1
12	100	100	0
13	100	100	0
14	100	100	0
15	60	76	+16
16	100	86	-14
17	100	100	0
18	80	100	+20
19	50	90	+40
20	90	86	- 4
21	100	100	0
22	82	70	-12
23	100	100	0
24	76	100	+24
25	100	100	0
26	100	100	0
27	100	100	0
28	100	90	-10

Table II - Officer NBC Test Scores

IV. NBC DEFENSE IN THE FLEET MARINE FORCE

A. STRUCTURE OF THE FLEET MARINE FORCE

"If we expect diplomatic efforts to be effective, we must maintain a capability to defend these interests whenever and wherever necessary. Yet we cannot maintain prepositioned forces in every potential overseas crisis area... This is the principal reason why the United States has a continuing need for its Fleet Marine Forces - instantly ready and highly mobile - to provide the nation's only major capability of forcible entry. The need for this capability in crisis management is fundamental."

General Louis H. Wilson
Commandant, U.S. Marine Corps

Public Law 416, 82nd Congress established the force structure of the Marine Corps at not less than three combat divisions and three air wings, with other land combat, aviation, and other services as may be organic therein. The Fleet Marine Force constitutes the General Purpose Forces of the Marine Corps assigned to the Operating Forces of the U.S. Navy, and are organized, trained, and equipped for service with the Fleets in seizure and defense of advanced bases; for land operations related to naval campaigns; development of amphibious tactics, technique, and equipment; training the maximum number of Marines for war or emergency expansion; and immediate expeditionary service where, when, and as directed.

Working directly for the Commanders-in-Chief of the Atlantic and Pacific Fleets, the Fleet Marine Force is structured into two major commands, Fleet Marine Force, Atlantic (FMFLANT), and Fleet Marine Force, Pacific (FMFPAC), respectively. Further subdivision into three Marine Divisions

(MARDIV), three Marine Aircraft Wings (MAW), and two Force Troops (FORTPS) organizations provides the basic organizational structure for the approximately 110,000 Marines assigned to the Fleet Marine Force. Respective Headquarters are presently located in the following geographical locations as depicted in Figure 1.

The Fleet Marine Force is required to maintain a satisfactory state of readiness to engage in low, medium, and high intensity war, to meet standing commitments for deployments, and to execute various contingency plans. The aggregation of Fleet Marine Forces into self-sufficient and self-sustaining forces is accomplished upon directions from the Commanding General of either FMFLANT or FMFPAC. During actual operations ground and aviation elements remain divided into their distinct and respective commands but are controlled by temporary ad hoc headquarters, which are generated when a specific commitment of forces is required. Organization into a Marine Amphibious Force (MAF, comprised of one or more divisions, aircraft wings, and Force Troop organizations), a Marine Amphibious Brigade (MAB, comprised of an infantry regiment, composite aviation group, and Force Troops elements), or a Marine Amphibious Unit (MAU, comprised of an infantry battalion, composite aviation squadron, and Force Troops elements) is accomplished using existing forces under designated commanders. Such units are task organized to meet the requirements of each assigned contingency or task and to fulfill mission accomplishment within the initial employment, with follow-on logistical

support, if required, arriving within a specified time period. An increasing number of Marines will see service with the FMF in future years as the ratio of combat forces to support forces increases. The FMF is presently functioning at a manning level (M/L) considerably below the strength authorized by tables of organization (T/O) for the three division/wing teams. Headquarters, Marine Corps (HQMC) opines that a Corps of 212,000 Marines is necessary to maintain three division/wing teams with a full range of combat capability. Today's Marine Corps falls somewhat short, with a 191,500 personnel strength authorized for Fiscal Year 1978. Current Marine Corps manpower requirements project the following Fleet Marine Force levels in Fiscal Years 1977, 1978, and 1979.

General Purpose Forces (in thousands)

	<u>FY1977</u>	<u>FY1978</u>	<u>FY1979</u>
Land Forces	79.8	80.3	81.9
Tactical Air Forces	27.7	29.3	29.2
Naval Forces	<u>.5</u>	<u>.5</u>	<u>.5</u>
Total	108.0	110.1	111.6

The concentrating of strength where the greatest threat exists and task organizing, equipping, and positioning of Fleet Marine Forces in the most effective manner will permit the Marine Corps to continue to support its three division/wing teams and perform its missions.

B. NBC DEFENSE ORGANIZATION IN THE FLEET MARINE FORCE

By doctrine, Fleet Marine Force organizations are organized, equipped, and trained to fight in nuclear warfare, non-nuclear warfare, and under the threat of nuclear warfare. Additionally, the Marine Corps is responsible for chemical operations related to its assigned functions, including defense against enemy chemical and biological weapons. Inherent in Fleet Marine Force missions are the provisions for individual and organization protection from nuclear, radiological, biological and chemical attack.

The Marine Corps NBC defense program was established in 1953 as the Atomic, Biological and Chemical (ABC) defense program, and later redesignated the Nuclear, Biological and Chemical (NBC) defense program. Marine Corps Tables of Organizations (T/O's) were written to include NBC Defense Specialists (military occupational specialty (MOS) 5711) at battalion and squadron levels, NBC Defense Officers (MOS 5702) at regimental and Marine Aircraft Group (MAG) levels, and additional billets as determined necessary within supporting organizations. NBC defense schools were established at Division, Force Troops, and Marine Aircraft Wing commands, using lesson plans written by the U.S. Army Chemical Corps, with only that information applicable to Marine Corps equipment, policy, and tactics extracted for presentation.

The NBC Defense Specialist, usually a Corporal or Sergeant, is located in the S-3 Section (Operations/Training) of the battalion or squadron. He is tasked with maintaining his

organization's NBC defense equipment, training its Marines in NBC defense measures and protection, and, in coordination with the NBC Defense Officer, advising the Commander on all NBC defense matters. All Fleet Marine Force organizations without an NBC Defense Specialist are required to assign one officer and appropriated enlisted assistants to NBC defense duties on an additional duty basis. The number of Marines thus assigned to NBC defense duties increases greatly at battalion and squadron level, as Control Center, Decontamination, and Monitor/Survey teams are required by NBC defense standing operating procedures (SOP's) within individual commands. During active NBC warfare, additional NBC trained personnel will be required to meet battalion/squadron and regimental requirements.

SOP's designate organization, equipment, and functions of unit control center, decontamination, and monitor/survey teams. An organization Control Center Team, comprised of the NBC Defense Officer and NBC Defense Specialist, and three enlisted assistants (computer, recorder, and plotter) will be available to coordinate all NBC defense team activity and advise the commander on NBC defense matters. Control Center Teams are located at both battalion/squadron and regiment/group levels. A Decontamination Team, normally comprised of a non-commissioned officer and nine enlisted assistants, will be trained to provide an equipment and personnel decontaminating capability. Monitor/Survey teams are established on the basis of Table of Equipment (T/E) radiac instruments and chemical agent detector kits held

by each respective organization. A primary and secondary operator are normally required for each instrument/kit, with drivers, radio operators, and security personnel being provided as necessary. Monitor/Survey teams provide the capability of detecting any known chemical agent, taking biological samples, conducting ground and aerial radiological surveys, and assisting in calculations required in determining organizational NBC defense decisions.

At the present time, there is no provision providing for the establishment of the above teams other than local directives; they must additionally provide their own training once they are organized, and this is normally accomplished in coordination with the organization NBC Defense Officer and NBC Defense Specialist.

1. NBC Defense Billet Descriptions

MOS requirements which presently exist within Marine Corps Occupational Field (OF) 57: Nuclear, Biological, and Chemical, are extracted from the Marine Corps MOS Manual and presented in Appendix E. MOS 5702 and MOS 5711 provide the foundation for the NBC defense program within each organization and will be discussed in detail in future sections.

2. NBC Defense Personnel

a. OF 57 Distribution

Table III provides current OF 57 personnel assets, officer and enlisted, for the Marine Corps and those assigned to the Fleet Marine Force. Of the officers, 71 hold MOS 5702 as their first additional MOS and 43 hold it as their second

additional MOS. The only officers eligible to hold a primary MOS 5702 are Warrant Officers; all other officers hold MOS 5702 as an additional MOS. Enlisted Marines hold MOS 5711 as a primary MOS, but are utilized to fill other billets as determined by their respective commands.

An examination of both the officer and enlisted grade distribution discloses a shortage of trained personnel in the officer company grade ranks and the lower enlisted grades. The large number of field grade officers and staff non-commissioned officers holding MOS 5702 and MOS 5711, respectively, lends credence to the claim that the NBC defense field has received decreased emphasis in recent years. This evidence is reflected in the one Marine Corps and five Fleet Marine Force MOS 5702 primary billets; each of which specifies a company grade officer. Current officer and enlisted NBC defense assets are not aligned to existing T/O requirements. This creates a serious continuity problem to staffing T/O billets with the level of expertise and experience desired. Battalion and Squadron NBC Defense Officer billets require Warrant Officers (WO-1) through Captains (O-3) for the officer assignments. Enlisted NBC Defense Specialist billets require Sergeants (E-5) at the battalion level and Corporals (E-4) at the squadron level.

For the NBC Defense Officers, whether serving in a primary or a secondary NBC defense billet, advancement to field grade usually terminates that individual's active involvement in any directly-related NBC defense work. There are six Major (O-4) secondary billets and one Lieutenant

Colonel (O-5) secondary billet presently in the Fleet Marine Force. NBC Defense Specialist billets exist only for the grades of Corporal (E-4) through Master Sergeant (E-8).

b. OF 57 Billet Requirements and Utilization

Table IV provides OF 57 billet requirements and current manning within Fleet Marine Force organizations as of 25 May 1977. There are five MOS 5702 primary billets and 249 MOS 5711 primary billets within the Fleet Marine Force. Of the five officer billets, only one is manned by a MOS 5702 officer. Although only five MOS 5702 primary billets exist, every company-sized unit has the requirement that an officer be assigned NBC defense duties on a collateral-duty basis. It is presently impossible, given available officer assignment data, to determine actual utilization of the remaining MOS 5702 officers presently assigned to the Fleet Marine Force; it is envisioned, however, that they are assigned NBC defense collateral duties consistent with sound officer assignment policy within each organization. With 249 MOS 5711 billets existing in the FMF and only 190 MOS 5711 Marines presently assigned to MOS 5711 billets, a 69-man shortage currently exists. This corresponds to a 76.3% manning level for NBC Defense Specialists.

C. NBC DEFENSE ORDERS AND DIRECTIVES

1. MCO 3400.3

Marine Corps Order (MCO) 3400.3 is the primary NBC defense order for all Marine organizations. This order promulgates NBC defense readiness and training requirements, and

specifies a mandatory requirement for all commands to develop and maintain effective operating procedures, necessary supporting directives, and a high state of training to minimize reduction in mission effectiveness resulting from an NBC attack. This order specifically requires that all commanders:

a. Maintain a capability to defend against the employment of NBC weapons.

b. Ensure training of every Marine in individual protective measures.

c. Organize NBC defense capabilities with necessary personnel and equipment down to company/battery level for ground units and squadron level for aviation units.

d. In selection/assignment of NBC defense specialist personnel, (1) assign, for units not provided with NBC defense T/O billets, one officer and appropriate enlisted assistants to NBC defense duties on an additional duty basis, and (2) ensure that personnel assigned to additional duty NBC defense billets are graduates of a division-level NBC defense school or its equivalent.

e. Develop proficiency tests to determine their unit's degree of proficiency.

f. Ensure that individual and unit NBC equipment and associated supplies are maintained in a high state of material readiness.

FMF Commanders will also:

g. Be able to conduct offensive operations in a toxic environment.

h. Integrate NBC defense training with field training exercises whenever possible.

The attainment of individual and unit NBC defense proficiency and readiness is further guided by procedures in three U.S. Army Field Manuals (FM):

FM 21-40; Chemical, Biological, Radiological and Nuclear Defense;

FM 21-41; Soldier's Handbook for Defense against Chemical and Biological Operations and Nuclear Warfare;

FM 21-48; Chemical, Biological, and Radiological (CBR) and Nuclear Defense Training Exercises.

2. MCO 1510.2

Marine Corps Order 1510.2 provides a program for the Individual Training of Enlisted Marines (ITEM). The purpose of the ITEM program is to develop skilled forces-in-readiness to carry out any assigned mission through a training program encompassing those essential subjects prescribed by the Commandant of the Marine Corps (CMC). Essential subject training and subsequent essential subject training evaluation are provided to ensure that enlisted Marines in the rank of Gunnery Sergeant (E-7) and below maintain proficiency in the following essential subjects:

- Code of Conduct and Military Law/Uniform Code of Military Justice
- History, Customs, and Courtesies
- Close Order Drill
- Interior Guard
- First Aid and Field Sanitation
- Uniform Clothing and Equipment
- Physical Fitness
- NBC Defense
- Service Rifle and Marksmanship*
- Individual Tactical Measures*

*(Applicable to enlisted men only; all other subjects applicable to both enlisted men and women)

Written examinations are administered on an annual basis to determine individual deficiencies. Failure to meet established minimum passing scores on each test necessitates attendance at essential subject training classes for all subjects not passed. The "test before training approach" thus enables limited training resources to be used in the most efficient manner. Retesting is required in each subject after additional instruction is provided until a passing score is obtained.

Evaluation of essential subject training is oriented towards practical application and implementation of techniques instructed in classes and field exercises. Essential subject performance objectives are specified in enclosure (3) to the basic order for each essential subject. An examination of the NBC defense performance objectives discloses a field-oriented approach to individual NBC defense measures and protection. Present NBC defense performance objectives are:

- a. Remove, don, seat, clear and check the Field Protective Mask within nine seconds (15 seconds if the M6A2 protective mask hood is attached).
- b. Mask and cover body with poncho within 20 seconds.
- c. Move through a contaminated area with minimum contact.
- d. Drop on stomach, close eyes, protect hands, neck and face from a simulated nuclear blast.
- e. Take cover in a shelter and crouch/lay back in direction of blast--remain until 90 seconds have passed.

f. Fire ten rounds with the service rifle with 60% first round hits, at distances up to 457 meters, while wearing the Field Protective Mask (on an annual basis).

Practical testing of essential subjects' proficiency is used to determine the extent to which academic training can be implemented into usable knowledge to ensure survivability under NBC defense conditions. In the area of NBC defense testing and evaluation, a total familiarization with individual protective NBC defense equipment and protection measures is required for successful test completion.

3. MCO P1500.17

Marine Corps Order P1500.17 concerns Fleet Marine Force unit training and provides training objectives which are recommended for incorporation into unit mission, integrated, concurrent, special, and reserve training. The following considerations are provided as appropriate in the development of concurrent NBC defense training objectives into mission-oriented training exercises:

a. The enemy's capabilities in employment of nuclear and chemical munitions.

b. Tactical proficiency of units in detecting the presence of chemical agents and the subsequent warning actions.

c. Proficiency of units in assuming a chemical defense posture (i.e., rapid employment of protective masks, rapid dressing in protective clothing).

d. Proficiency of units in conducting combat operations while wearing protective clothing and masks.

e. Proficiency of unit monitoring and decontamination teams.

4. MCO 3400.4

Marine Corps Order 3400.4 concerns the dissemination of U.S. Army Graphic Training Aid (GTA) 3-7-2, "Things to Do Under Nuclear, Biological, or Chemical Attack." This is a small, pocket-sized publication which provides the individual Marine general guidance when operating within an NBC environment.

5. MCO 5711.36

Marine Corps Order 5711.36 contains the organization and standards for NBC defense as applied to NATO forces.

6. FMFM 11-1

Fleet Marine Force Manual (FMFM) 11-1 specifies organization and standards for individual team and unit NBC defense matters within the Fleet Marine Force. It is the "working manual" for all Fleet Marine Force NBC defense operations. At the present time it is being reevaluated by the FMF NBC Defense Schools at the request of the Marine Corps Development and Education Center (MCDEC).

7. FMF NBC Defense Orders and Directives

FMFLANT and FMFPAC publish separate NBC defense directives, which closely parallel MCO 3400.3 but with specific instructions applicable to that command's unique considerations. This is repeated and duplicated throughout the Division/Wing, Regiment/Group, and Battalion/Squadron command structure SOP's with additional requirements incorporated at each level

of command. The final order provides the "working" SOP at each respective organizational level. Due to the wide variation of emphasis placed on NBC defense matters by the different commands, it is not unusual that dissimilar requirements and guidance exist. Annual gas chamber exercises (GCX) are required in certain commands but not in others; quarterly NBC defense drills are conscientiously conducted in many commands but not in adjacent organizations. The commander's prerogative is nowhere more evident than when examining the NBC defense status of Fleet Marine Force organizations and units. It is the author's experience (two years as a FMF major command NBC defense inspector) that even sharing identical items of NBC defense equipment and manned by similarly trained Marines, there nonetheless is a wide variance in organization NBC defense effectiveness and readiness.

D. NBC DEFENSE EQUIPMENT

Fleet Marine Forces are equipped with the most modern individual and organization NBC defensive equipment available to ensure mission accomplishment within an NBC environment. Each organization's T/E lists those items of NBC defense equipment and the quantities authorized. These items are either issued to the individual Marine or physically stored in the organization's NBC defense ready locker, shelter, or supply warehouse, ready for immediate issue, use or embarkation. Appendix F provides information on NBC defense equipment available to Fleet Marine Forces and also discusses standard and non-standard decontaminants and NBC decontamination methods.

E. INSPECTIONS

Inspections which are conducted in all Marine Corps organizations and units are similar in method and motive. Written inspection reports are provided by the respective inspection team to the inspected organization upon completion of the inspection, following an inspection debrief to the organization commander. Corrective action, when required, is mandated in the organization's inspection order, which in turn specifies limits for correction of each noted discrepancy and the subsequent reporting of corrective action taken via the appropriate chain of command. In order of decreasing importance, the following echelons of formal inspections are conducted within the Fleet Marine Force.

1. Inspector General of the Marine Corps (IGMC) Inspections

SECNAVINST 5430.57 provides that the Commandant of the Marine Corps will conduct, or cause to be conducted, such inspections as are required for a continuing evaluation of Marine Corps organizations and units. MCO 5040.6 establishes the following inspection objectives which are subject to IGMC evaluation.

- a. The capability and readiness to accomplish assigned mission, tasks, and functions.
- b. Leadership and effective use of resources.
- c. Welfare, morale, and discipline.
- d. Compliance with Headquarters, Marine Corps policies, doctrine, and procedures.

e. Work practices and conditions which might expose personnel unnecessarily to injury and health hazards.

f. Local inspection procedures, to determine if they are keeping the commander informed of the conditions of the command.

Fleet Marine Force organizations are inspected biennially by the IGMC. An inspection schedule and tentative schedule for two successive fiscal years is provided in MCO 5040.5. No NBC defense inspectors are provided within any IGMC Inspection Team; to amend this, an augmentee inspector is assigned TAD to the Inspection Division from available Marine Corps assets (usually from the organization adjacent to the organization under inspection). The only area of NBC defense inspected by the IGMC is that of radiac instrument maintenance.

2. FMF Atlantic/Pacific Inspections

Both FMFLANT and FMFPAC inspect their respective subordinate commands during the alternate year that their command is not scheduled for inspection by the IGMC. Inspection teams from each of the respective headquarters battalions are tasked with inspection of all areas inspected by the IGMC. Once again augmentee inspectors are used to supplement FMF Headquarters Inspection Teams. The NBC defense portion of the inspection is normally conducted by a senior staff NCO from either an adjacent Marine Corps base or Marine Corps air station. This eliminates, to the maximum extent possible, any "conflict of interest" or subconscious bias on the part of the assigned inspector.

3. Marine Division/Marine Aircraft Wing Administration and Material (A&M) Inspections

The Division/Wing A&M Inspection generally precedes the IGMC/FMF Headquarters Inspection. A&M Inspections are conducted with organic personnel, meeting a schedule tailored to the deployments and exercises of the organization. In the NBC defense area, the A&M Inspection is the most comprehensive of the NBC defense inspections encountered. The respective NBC defense school staff is normally assigned to conduct the inspections, and being totally familiar with existing requirements, can readily assess unit effectiveness and readiness.

4. Marine Regiment/Marine Aircraft Group Inspections

Inspections of organic units are conducted at regiment/group level, using headquarters personnel and personnel from sister organizations. Such "in-house" inspections are normally comprehensive and, due to their basic "helpful" nature, provide for maximum presentability of the unit prior to higher-level inspection. The self-inspection program permeates to platoon and section levels, and is assisted by the ready availability of local or higher headquarters inspection "checklists" which specify the extent of each inspection. There are presently no true operational inspections, per se, that would enable evaluation of the overall capabilities and functioning of a unit in NBC defense matters or contingencies within the Fleet Marine Force.

Many of the NBC defense inspectors are obtained from NBC defense school personnel. Chapter V will provide further information on NBC defense inspection responsibility within each major FMF command.

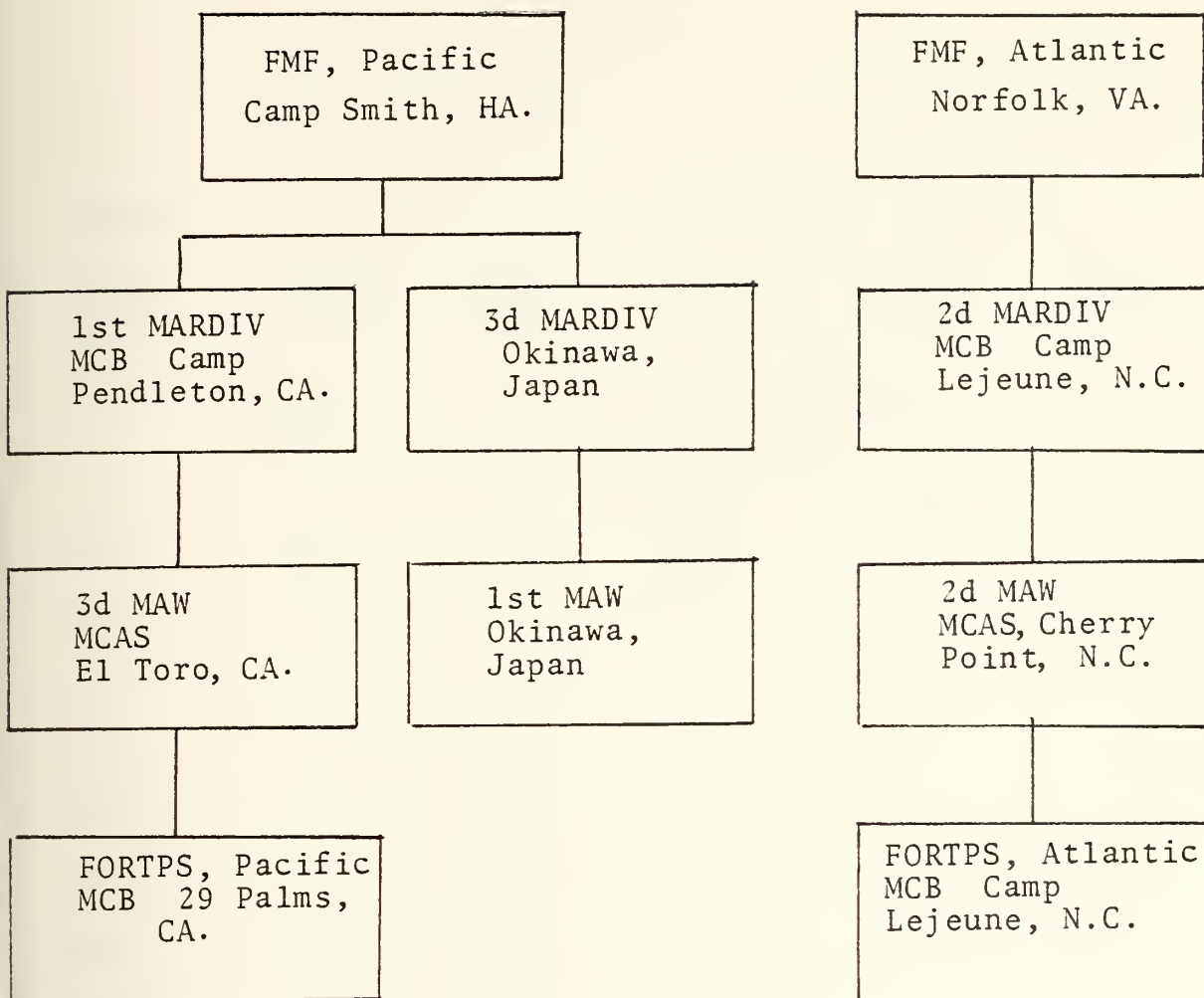


Figure 1 - FMF Major Commands

<u>Officer</u>			<u>Enlisted</u>		
<u>Grade</u>	<u>USMC</u>	<u>FMF</u>	<u>Grade</u>	<u>USMC</u>	<u>FMF</u>
O-6	3	1	E-9	3	2
O-5	25	7	E-8	9	6
O-4	48	24	E-7	48	29
O-3	20	7	E-6	103	78
O-2	8	6	E-5	103	96
O-1	1	1	E-4	20	16
CWO-4	2	2	E-3	4	4
CWO-3	5	4	E-2	2	2
CWO-2	2	1	E-1	<u>0</u>	<u>0</u>
WO-1	<u>0</u>	<u>0</u>	Total	292	233
Total	114	53			

Table III - OF 57 Distribution by Rank

MCC Location	MOS 5702			MOS 5702			MOS 5702			MOS 5711			MOS 5711		
	Primary Billets	On Board	in Other Billets	Primary Billet Shortage	Primary Billets	On Board	in Other Billets	Primary Billet Shortage	Primary Billets	On Board	in Other Billets	Primary Billet Shortage	Primary Billets	On Board	in Other Billets
110 HQ, FMFPAC		2	2												
111 HQ, FMFLANT		3	3						2						
121 1st MARDIV	1	5	5	1					30	25	2	7			
122 2d MARDIV		4	4						24	19	2	7			
124 3d MARDIV		2	2						13	13					
130 1st MARBGE		3	3						22	16	1	7			
142 2d MAW		3	3						32	25	2	9			
143 3d MAW	1	2	2	1					39	22	2	19			
144 2d LAAM BN									1	1					
145 1st MAW (Okinawa)	1	4	4	1					11	11	2	2			
146 1st MAW (Iwakuni)		2	2						11	11	1	1			
150 FORTSPAC	1	5	5	1					1	1					
151 2d PSSG	1	3	2						13	16	6	3			
160 2d MAW (New River)		5	5						25	16	1	10			
165 2d MAW (Beaufort)		2	2						13	7		6			
169 1st FSSG		2	2						12	12	2	2			
1CO HQ, I MAF		1	1												
1C1 HQ, III MAF		2	2												
1C2 3d FSSG		2	2						16	19	5	2			
1CD Camp Smith		1	1												
TOTALS	5	53	52	4	249	216*	26	69**							

Table IV - OF 57 Billets and Current Manning Level Within the FMF

Table IV (continued)

* A 17 unit MOS 5711 discrepancy exists in latest OF 57 billet/manpower readouts of FMF organizations

** A six unit MOS 5711 discrepancy exists in billet shortages

(Note: All figures provided by Office of Manpower Utilization, HQMC)

V. FMF NBC DEFENSE SCHOOLS

Marine Corps directives do not currently provide for a formal Marine Corps NBC defense school. With the U.S. Army Ordnance Center and School being the only school authorized to grant secondary MOS 5702 to Marine officers and primary MOS 5711 to enlisted Marines, the number of OF 57 personnel within the Marine Corps is thus directly related to the number of quotas available to the U.S. Army school. These quotas are established during the annual OF 57 study conducted by Headquarters, Marine Corps (Code OTTB), at which time a three-year projection for future OF 57 personnel needs is made. There are roughly 70 quotas available annually under the present study.

To fulfill the requirements for NBC defense personnel generated by MCO 3400.3, the Marine Corps operates four semi-formal NBC defense schools. These schools are located at 3d MAW, MCAS, El Toro, and 1st MARDIV, MCB Camp Pendleton, California, and 2d MAW, MCAS Cherry Point, and FMFLANT (Camp Geiger), MCB Camp Lejeune, North Carolina. Each school provides instruction and training to unit NBC defense personnel and team members. These schools are not authorized to grant any MOS. Commanding officers may grant a secondary MOS 5711 to their enlisted Marines who successfully complete a four-week NBC defense school in accordance with procedures contained in Marine Corps Order P1070.12.

The following Marine Corps NBC defense schools are in current operation within the Fleet Marine Force:

A. 3d MAW NBC DEFENSE SCHOOL

The 3d MAW NBC Defense School provides NBC defense instruction and training for the following Marine Corps commands:

3d Marine Aircraft Wing (El Toro, Santa Ana, and
Camp Pendleton, California and Yuma, Arizona)
Marine Corps Supply Center (MCSC), Barstow, California
Marine Corps Recruit Depot (MCRD), San Diego, California
MCAS, Yuma, Arizona
MCAS (Helicopter), Santa Ana, California
Force Troops Pacific, MCB, 29 Palms, California
First Force Services Support Group (1st PSSG),
Camp Pendleton, California

It additionally provides instruction, upon request, for all Marine Corps Reserve organizations located west of the Mississippi River. 3d MAW Order 3400.3 prescribes the command relationship, mission, courses of instruction, and administrative requirements of the school. Table V provides the T/O that is presently in effect at the 3d MAW NBC Defense School.

The Technical Assistance Team, commonly referred to as a "Contact Team," provides NBC defense assistance on an informal request basis to all 3d MAW and adjacent Marine Commands. Technical Assistance Team visits normally encompass all unit NBC defense aspects during a one-day (0800 to 1500) visit. Technical Assistance Team members are rotated on a regular basis within the 3d MAW NBC Defense School staff.

The 3d MAW NBC Defense Inspector is assigned from the school staff and assists in the conduct of 3d MAW A&M inspections and Commander, Air Bases West (COMCABWEST) inspections (upon formal request). The current inspector is a gunnery sergeant.

The school additionally provides gas chamber facilities for unit training exercises. A total of 3,195 personnel participated in 3d MAW gas chamber exercises conducted from 1 January 1976 through 15 August 1977.

Mandatory quotas to the 3d MAW NBC Defense School courses are assigned via 3d MAW training directives; quotas may be augmented via letter or by telephone in coordination with the Officer-in-Charge, 3d MAW NBC Defense School. At the present time the school is staffed with one officer and 15 enlisted Marines.

The school presents two courses of instruction:

1. NBC Defense Officer Course

This course is 20 instructional days in length and provides a working knowledge of all aspects of NBC defense. The course syllabus includes agents and effects, self- and first-aid measures, care and surveillance of NBC defense equipment, radiological plotting, decontamination, and Control Center operations. This course is normally scheduled twice a year. Course prerequisites are:

- a. One year obligated service remaining upon assignment.
- b. Nominees should be available for assignment to an NBC defense billet within their unit.
- c. Nominees must possess a Secret security clearance.

2. NBC Defense Basic Enlisted Course

This course is 15 instructional days in length and qualifies enlisted personnel to perform duties within the unit

NBC defense organization. The course syllabus includes effects, protective measures, techniques of monitoring and surveying, detection, identification, decontamination, and Control Center operations. Staff non-commissioned officers may be assigned to this class on request. This course is normally scheduled ten times per year. Course prerequisites are:

- a. Minimum GCT or Area Aptitude score of 100.
- b. High School graduate or have passed the GED test.
- c. Six months obligated service remaining upon assignment.
- d. Satisfactory motivation for assignment to a key position within the organization's NBC defense structure.
- e. Nominees must not be participating in any extra education programs that may affect their performance at NBC defense school.
- f. Nominees must not be awaiting punitive action.
- g. Nominees must be interviewed by their unit NBC Defense Officer to determine if any problem, personal or otherwise, exists that would inhibit the satisfactory completion of the course.
- h. Nominees must not be assigned on any current unit duty rosters.

B. FMFLANT NBC DEFENSE SCHOOL

The FMFLANT NBC Defense School provides NBC defense instruction and training for the following Marine Corps commands:

Second Force Service Support Group (2d FSSG), MCB
Camp Lejeune, North Carolina
Force Troops, Atlantic, MCB Camp Lejeune, North Carolina
2d Marine Division, MCB Camp Lejeune, North Carolina
2d Marine Aircraft Wing, MCAS Cherry Point, North
Carolina.

It additionally provides instruction, upon request, for all Marine Corps Reserve ground organizations of the 4th MARDIV located east of the Mississippi River. Force Troops Atlantic Order 5320.2 specifies school functions and requirements. Table VI presents the current T/O in effect which is staffed by both Force Troops, Atlantic, and 2d MARDIV personnel.

The FMFLANT NBC Defense School does not provide a Technical Assistance Team to Force Troops or the 2d MARDIV, but is studying the concept at the present time. NBC defense inspections for Force Troops, Atlantic units are conducted using the school staff, but 2d MARDIV NBC defense inspections are conducted by 2d MARDIV G-3 NBC defense personnel.

The school presents two courses of instruction:

1. NBC Defense Officer/SNCO Course

This course is 19 instructional days in length and is designed to qualify FMFLANT personnel from any MOS for assignment to unit NBC defense billets and train and provide instructional material so that graduates may be utilized by units in performing instructional duties. This course is divided into six subcourses: Nuclear Defense, Biological Defense, Chemical Defense, Radiac Instruments, NBC Protection, and NBC Operations. The only course prerequisite is that assignees have a minimum of six months obligated service remaining upon assignment. This course is normally scheduled four times a year.

2. NBC Defense Monitor/Survey and Decontamination Team Course

This course is 13 instructional days in length and is designed to train FMFLANT personnel for unit Monitor/Survey and Decontamination Team assignments. It is divided into five subcourses: Nuclear Defense, Biological Defense, Chemical Defense, Radiac Instruments, and NBC Protection. This curriculum is oriented to practical application, and in addition to the basic instruction, four quizzes, two comprehensive exams, and eight practical exams are administered. Course prerequisites are:

- a. High school graduate or have passed the GED test.
- b. Minimum GCT or Area Aptitude score of 100.
- c. Six months obligated service remaining upon assignment.

The School Director is authorized to waive the first two prerequisites for basic 5700 personnel (assigned directly from Infantry Training School for on-the-job training) and assignees from FMFLANT units. This course is normally scheduled 11 times a year. Upon successful course completion, a list of all graduates is forwarded to Headquarters, Marine Corps (Code MMEA and MMDA).

The FMFLANT NBC Defense School provides a post-graduation evaluation questionnaire to the Commanding Officers of all school graduates; this form is designed to evaluate the performance of graduates within their unit in their NBC defense capacity. Feedback from this questionnaire enables the school to correct or modify course content in subsequent courses, if

applicable, and implement any positive critique regarding the curriculum.

A M12A1 Skid Mounted Decontamination Apparatus (SMDA) Operator's Course is provided to graduates of any NBC defense school for a two-day period. This course is provided to assist unit commanders in maintaining unit NBC defense capabilities and provides the instruction necessary to maintain and operate the M12A1.

The FMFLANT NBC Defense School is presently the only Marine Corps NBC Defense School which possesses adequate facilities for the purpose of granting a primary MOS 5711. The school is currently staffed with two officers and 13 enlisted Marines.

C. 1st MARDIV NBC DEFENSE SCHOOL

The 1st MARDIV NBC Defense School provides NBC defense instruction and training for all 1st MARDIV units as part of the 1st MARDIV School Complex (NBC Defense School, 81MM Mortar School, and two NCO Leadership School courses. 1st MARDIV Order 1510.1 establishes the school complex and specifies administrative requirements. There is no formal T/O for the NBC Defense School staff, and only two instructors are presently assigned from the Division G-3, the NCOIC (Master Sergeant) and his assistant (Gunnery Sergeant). A third instructor has been requested to assist with future classes.

There is no Technical Assistance Team organization within the school, nor does the 1st MARDIV NBC Defense School staff become involved in assisting in Division inspections.

Gas chamber facilities are available at the school for unit use, but due to the wide geographical separation of Division units, each organization maintains their own gas chamber facilities.

The school presents two courses of instruction:

1. Staff NCO and Officer NBC Defense Course

This course is ten instructional days in length and provides a basic course for staff non-commissioned officers and officers, with particular emphasis on maintenance of T/E items, chemical and nuclear defense, and individual and unit protective measures. There are no course prerequisites and two classes are normally scheduled each year.

2. Enlisted NBC Defense Course

This course is 15 instructional days in length, and provides a basic course in all areas of unit and individual NBC defense to qualify graduates as unit NBC Defense team members. Course prerequisites are:

- a. GCT or Area Aptitude score of 90.
- b. Six months' obligated service remaining upon assignment.

The School Director is authorized to waive the GCT/Area Aptitude prerequisite for those Marines whom he determines possess the aptitude and motivation necessary for successful course completion. Six classes are normally scheduled each year; commencing in September 1977, a four-week course will be presented, but the exact course mix for future scheduling has not yet been determined.

Officers and staff non-commissioned officers may be assigned to the enlisted course and vice versa. During the Division G-3 Quarterly Training Conferences, classes which are to be presented and respective quota assignments are determined.

D. 2d MAW NBC DEFENSE SCHOOL

The 2d MAW NBC Defense School is in the process of rebuilding and revising after its closure during 1976 and subsequent revival this year. At the present time there is no order directing its establishment or purpose although such an order is currently being written. This school serves all 2d MAW units and units of the 4th MAW (Reserve) located east of the Mississippi River. The current school staff is comprised of:

<u>Billet</u>	<u>Rank</u>	<u>MOS</u>	<u>Total</u>
OIC	Lt	Unrestricted	1
NCOIC	MSgt	5711	1
Instructor	SSgt	5711	2
Instructor	Sgt	5711	<u>2</u>
			6

The school offers one course, the 2d MAW Monitor and Decontamination Course, which is ten instructional days in length. The course is scheduled 20 times per year. Instruction is limited to basic NBC defense team matters. Course prerequisites are:

- a. Minimum GCT score of 100.
- b. Nine months' obligated service remaining upon assignment.

There is no officer/staff non-commissioned officer course offered; 2d MAW NBC Defense Officers attend the FMFLANT NBC Defense Officer/SNCO Course, as do certain selected enlisted Marines.

The school provides gas chamber facilities for all MCAS Cherry Point, North Carolina, Marines. The school does not provide a Technical Assistance Team.

E. NBC DEFENSE SCHOOLS WITHIN THE WESTERN PACIFIC AREA

NBC defense training for Marines assigned to the Western Pacific area is conducted within each organization due to the lack of formal or semi-formal schooling facilities.

The 3d MARDIV has established a Technical Assistance Team for their units; this team provides a three-day block of instruction to the unit's NBC defense team members, followed by a one-day assistance program designed to aid the unit NBC Officer and NBC Defense Specialist/NCO in their unit NBC defense matters. Present plans call for the presentation of a three-week NBC defense course to be offered once a quarter.

The 1st MAW, upon the closure of the 3d MARDIV NBC Defense School, began a Monitor/Survey and Decontamination Course at the MCAS Iwakuni, Japan. This school was terminated in July 1977.

The 1st Marine Brigade, Camp Smith, Hawaii, is conducting a monitor/survey and decontamination course for 1st Marine Brigade Marines. This school is not considered comparable to the four semi-formal NBC Defense Schools and is concerned with the training of 1st Marine Brigade NBC defense team personnel.

F. A COMPARISON OF FMF NBC DEFENSE SCHOOLS

The major characteristics of each of the four semi-formal NBC Defense Schools currently in existence are provided in Table VII to display their wide diversity and current operating status.

NBC Defense School Staff

<u>Billet</u>	<u>Rank</u>	<u>MOS</u>	<u>Total</u>
OIC	Capt/Lt/WO	5702	1
NCOIC	MGSgt/MSgt	5711	1
Chief Instructor	GySgt/SSgt	5711	1
Instructor	GySgt/SSgt	5711	3
Instructor	Sgt/Cp1	5711	3
Clerk/Typist/Driver	Cp1/LCp1	0141/3531	1
Corpsman/Instructor	HM-1,2,3	8403	<u>1</u>
			11

Technical Assistance Team

<u>Billet</u>	<u>Rank</u>	<u>MOS</u>	<u>Total</u>
NCOIC	GySgt	5711	1
Instructor	SSgt	5711	1
Instructor	Sgt	5711	2
Clerk/Typist	Cp1/LCp1	0141	<u>1</u>
			5

Table V - 3d MAW NBC Defense School T/O

Billet	Rank	MOS	Source/Total
Director	Major/Capt	5702	FORTRPS 1
Assistant Director	Capt/Lt	Unrestricted	2dMAWDIV 1
Operations Chief	MSgt/GySgt	5711	FORTRPS 1
Instructor/Supervisor	GySgt	5711	2dMAWDIV 1
Senior Instructor	SSgt	5711	2dMAWDIV 3
Instructor	Sgt	5711	FORTRPS 2
Instructor	Sgt	5711	2dMAWDIV 2
Corpsman/Instructor	HM-1	8403	FORTRPS 1
Engineer-Maintenance Man	Cpl	1341	FORTRPS 1
Training Support NCX	Cpl	5711	2dMAWDIV 1
Admin Man	Cpl	0151	FORTRPS 1
Supply Clerk	Sgt	3043	2dMAWDIV 1
Driver/Assistant Supply Clerk	Cpl	3531	FORTRPS <u>1</u>
			17

Table VI - FMFLANT NBC Defense School T/O

	<u>2d MAW</u>	<u>3d MAW</u>	<u>1st MARDIV</u>	<u>FMFLANT</u>
Formal School Order	No	Yes	Yes	Yes
School Staff (Off/enl)	1/5	1/15	0/2	2/15
M/S & Decon Cse (days)	Yes (10)	No	No	Yes (13)
Enlisted NBCD Cse (days)	No	Yes (20)	Yes (15)	No
Officer/SNCO Cse (days)	No	Yes (20)	Yes (10)	Yes (19)
Classes/Year: M/S & Decon Cse	20	0	0	11
Classes/Year: M/S & Enlisted NBCD Cse	0	10	6	0
Classes/Year: Off/ SNCO NBCD Cse	0	2	2	4
NBC Defense Inspector	Yes	Yes	No	Yes
Technical Assistance Team	No	Yes	No	No
Gas Chamber Facilities	Yes	Yes	Yes	Yes

Table VII - Comparison of FMF NBC Defense Schools

VI. NBC DEFENSE TRAINING AND OPERATIONS IN THE FMF

A. NBC DEFENSE TRAINING IN THE FMF

NBC defense training has been incorporated into practically every facet of Marine Corps individual training. The major training vehicles used within the Marine Corps are examined in the following chapter and correspond to respective officer and enlisted career patterns.

1. Officer Candidate School (OCS) and The Basic School (TBS)

OCS and TBS, both located at MCDEC, Quantico, Virginia, are the initial formal training mechanisms used to process and evaluate Marine Officer Candidates prior to commissioning and to provide basic officer training to the newly commissioned officer, respectively. OCS provides a broad overview of the Marine Corps during an intensive ten-week session of indoctrination and training. There is, however, no NBC defense instruction presented during OCS. Upon successful completion of OCS, the new Second Lieutenant enters TBS, currently 22 weeks in length. TBS prepares the Lieutenant for his apprenticeship in the FMF; courses cover all major topics and practical field applications are associated with most classroom instruction. A total of five hours is devoted to NBC defense during TBS; this is separated into three hours of NBC lectures and a two hour gas chamber exercise. Riot control agent CS is employed during two field exercises. By the time an officer is assigned to his first command, his knowledge of NBC defense is limited

to this short indoctrination. The current NBC defense instructor at TBS does not hold MOS 5702.

2. CBR Officer Course

A selected few Marine Officers (six during FY 1978) will attend this course which is presented at the U.S. Army Ordnance Center and School, U.S. Army Proving Ground, Aberdeen, Maryland. This is a four-week course and is offered ten times per year. Its purpose is to train officers of all arms and services in chemical, biological and radiological operations and applicable training techniques. The scope of the course includes operations, training and intelligence, logistics, technical aspects of biological and chemical operations, nuclear operations and radiological defense, protection and material, and medical training and support. Course prerequisites are an interim Secret security clearance and be in the rank of First Lieutenant through Major. Graduates of this school are assigned MOS 5702 by the Commandant of the Marine Corps. Headquarters, Marine Corps controls quotas to the school, and normally assigns all quotas to FMF commands.

3. Communication Officers Advanced Course (ACOC), Marine Corps Amphibious Warfare School (MCAWS), and Marine Corps Command and Staff College (MCC&SC)

ACOC and MCAWS are the two Marine Corps intermediate level schools for Captains and Majors. Located at MCDEC, Quantico, Virginia, both curricula are nine months in length and are entirely classroom/lecture oriented. Each course presents the identical three hour block of instruction on foreign NBC offensive and defensive capabilities.

MCC&SC, the only Marine Corps high level school, which is also located at Quantico, Virginia, presents only two hours of instruction on foreign nuclear and chemical capabilities; the biological brief is omitted due to a time constraint. The program of instruction (POI) in each of the three school presentations is identical and is presented by instructors from the Supporting Arms Instruction Division, Education Center, MCDEC. At the present time, none of the instructors possess MOS 5702. During calendar year 1978 classes, each school is tentatively scheduled to receive instruction from the Department of Defense Interservice Nuclear Weapon School (INWS), Kirtland Air Force Base, Albuquerque, New Mexico. ACOC and MCAWS will receive a 14-hour block of instruction and MCC&SC will receive a six-hour block of instruction. This instruction will fill the void in the current curricula and provide a deeper appreciation and knowledge of NBC defense matters to future Marine Corps commanders and policy makers.

4. Marine Corps Recruit Training and Infantry Training School (ITS)

The two Marine Corps Recruit Depots (MCRD), located at San Diego, California and Parris Island, South Carolina, provide entry-level training for new Marine recruits. Their respective Recruit Training Regiments provide 11 weeks of training, all of which is presented at an extremely basic level. Such is the case with NBC defense; the recruit receives four hours of NBC defense instruction in conjunction with essential subjects training (discussed in Chapter IV). This instruction includes the proper fitting and care of the FPM,

participation in a gas chamber exercise, and live-fire of the service rifle while wearing the FPM. Lesson POIs are oriented toward the practical application of individual protective techniques and procedures while operating within an NBC environment. Specialized weapons training at ITS, located at MCB Camp Pendleton, California, and MCB Camp Lejeune, North Carolina, follows MCRD training and covers a 20-day course. No NBC defense material or procedures are instructed during ITS.

5. CBR Enlisted Course

This course is the enlisted counterpart of the CBR Officer Course and is also located at Aberdeen, Maryland. Material presented during this four-week course is nearly identical to the CBR Officer Course with the exclusion of classified lectures. Graduates are assigned MOS 5711. No security clearance is required and the course is available to all enlisted personnel with a GCT of 100 or a standard score of 100 in aptitude area GT. Twenty CBR Enlisted Courses are scheduled each year. Quotas are controlled by Headquarters, Marine Corps. Assignees to this school are predominantly Corporals and above who have reenlisted under a school option. During FY 1978, 68 enlisted Marines will attend this course.

6. FMF NBC Defense Schools

FMF NBC defense schools were discussed in detail in Chapter V. Training offered by these schools is oriented toward unit NBC defense team personnel training and NBC Officer/NCO training. Table VIII provides the total number of

graduates during the period from 1 January 1977 through 15 August 1977. The majority of the graduates were Monitor/Survey and Decontamination Course trainees, accounting for 59.3% of the total; 12.1% of all graduates were officers. Tables IX and X provide a comparison of the curricula of the FMF NBC Defense Schools by subcourse and content.

7. Marine Corps Extension School Correspondence Courses

Marines unable to attend the Staff Non-commissioned Officer Academy (SNCOA), TBS, MCAWS, or MCC&SC are provided the opportunity to participate in their respective level course through correspondence courses offered by The Extension School, Education Center, MCDEC, Quantico, Virginia. The completion of the correspondence extension course (EC) is considered the equivalent to the resident course for all appropriate purposes, including assignment, promotion, and satisfying professional level schooling requirements.

The times allocated (in estimated hours of student effort) in each respective course for NBC defense are: SNCOAEC: none; TBSEC: nine hours; MCAWSEC: 12 hours, and MCC&SCEC: four hours. It must be noted that it is difficult to compare or equate the effectiveness of a home study program with the benefits derived from resident instruction.

8. Marine Corps Institute

The Marine Corps Institute (MCI), located in Washington, D.C., provides all Marines the opportunity to expand their professional skills within or outside of their MOS. Courses are offered in practically every MOS, and three such courses are offered in NBC defense:

a. MCI Course 03.25: NBC Defense for the Marine

This course is designed for all MOS's encompassing the grades of Private through Master Gunnery Sergeant. Six (6) lessons, which cover a total instructional time (estimated) of 14 hours, instruct Marines how to prepare themselves to carry out their mission under the threat of, or under conditions resulting from a NBC attack. Emphasis is placed on NBC defense for the individual Marine with specific guidance on what to do before, during, and after NBC attacks.

b. MCI Course 57.6: Chemical Warfare Defense

This course is designed for MOS 5711 and those Marines in the rank of Private through Gunnery Sergeant. It is comprised of four lessons with a total instructional time of 12 hours. It instructs detection and identification equipment, decontamination and related equipment, the NBC defense unit, self- and first-aid, preventive maintenance, and storage of selected chemical equipment.

c. MCI Course 57.7: Nuclear Warfare Defense

This course is designed for MOS 5711 and encompasses grades of Corporal through Master Gunnery Sergeant. Four lessons provide a total instructional time of 19 hours. This course provides a source of references and study material which, when combined with on-the-job training, will enable the NBC Defense Specialist to determine the effects of nuclear explosions and determine entry and stay time in a contaminated area.

MCI courses are excellent training devices with one exception: MCI participation is strictly voluntary. The vast majority of commands "strongly encourage" MCI participation, but this is with near disregard for the subject matter studied. The authors' experience has shown that Marines thusly "encouraged" will either enroll in a course in which they are totally familiar with the course material or a course that requires the shortest period of time for completion. This personal effort ensures recognition by the command but only a minimal effort on the Marine's part. As long as these attitudes prevail, the MCI NBC defense courses will remain a valuable but relatively undiscovered source of information for all but a few conscientious Marines.

9. NBC Defense Related Courses

There are three formal courses of instruction available to selected Marines which are closely related to NBC defense and require prior NBC defense knowledge and training.

a. Technical Escort Course

This is a four-week course conducted at the U.S. Army Missile and Munitions Center and School, Redstone Arsenal, Huntsville, Alabama. The course provides technical instruction in the safe handling of toxic materials and is open to Captains and below in the officer ranks and Staff Sergeants through Privates First Class in the enlisted ranks. Quotas are controlled by Headquarters, Marine Corps, and no MOS is granted upon course completion.

b. Marine Nuclear Ordnance Platoon (NOP) Course

This is a six-week school conducted by the Naval Weapons Training Group Pacific, NAS North Island, San Diego, California. This course trains selected officers and non-commissioned officers for duty with Marine Nuclear Ordnance Platoons. Two classes are presented annually, and Warrant Officers through Captain and enlisted Marines in the grade of Staff Sergeant are eligible for attendance. Officers receive MOS 5720 and enlisted personnel MOS 8062, upon course completion.

c. Marine Nuclear Weapons Assembly Team

This is an eight-week school also conducted by the Naval Weapons Training Group Pacific. The course trains selected officers and non-commissioned officers for duty with the Marine Wing Weapons Unit (MWWU) and covers the mission and technical training required to maintain and handle nuclear weapons assigned. This course is presented once a year; upon course completion officers are assigned MOS 5710 and enlisted personnel MOS 8061.

B. NBC DEFENSE OPERATIONS IN THE FMF

NBC operations in the FMF during the past decade have been restricted to the use of riot control agents and chemical defoliants. Both of these chemical agents saw only limited usage during FMF involvement in Southeast Asia.

RCA CS, in its different weapons systems (grenades, dispensers, shells, projectiles, launchers, and cartridges) was used as an effective means of clearing out enemy bunkers.

A combination of CS and smoke was used in the streets of Hue, Republic of South Vietnam (RVN) during the Tet offensive of 1968, providing excellent cover for Marine forces. CS was primarily used in hand grenade form (M7A2 and M25A2 grenades), but reliance for tactical delivery was placed on the E8 Tactical CS Launcher. This 34-pound launcher contains 64 35-millimeter cartridges, each of which has an individual propellant charge. When fired, either manually or electrically, all cartridges are discharged at once and fall in an elliptical pattern; the range to the center of the pattern can be adjusted from 0 to 150 meters. CS 40-millimeter cartridges for the M79 grenade launcher were used to supplement coverage provided by the E8's. CS was used extensively in an operation conducted by the 3d Battalion, 7th Marine Regiment, 1st Marine Division during the 1969 post-Tet offensive to dislodge North Vietnam Army (NVA) forces of the 141st NVA Regiment. The E8 launcher was later adapted for installation on M35 trucks to afford an incapacitating and screening shield for convoys which were continuously subjected to ambush. The use of selected herbicides (2-4D, 2-4-5T) was effective in reducing the heavy vegetation surrounding Marine fire support bases in Northern I Corps during 1969 and 1970. Fortunately, enemy employment of chemical weapons was virtually nonexistent; a few reported attacks were not substantiated and although Marines did have opportunities to use their FPM, it was normally with the benefit of forewarning and in conjunction with friendly CS employment.

Much has been written up to this point concerning the threat, organization, schools, and training related to NBC defense. It has been objective in nature and has presented a detailed examination of the structure of the Marine Corps NBC defense field. The "bottom line" must soon be reached and the question asked "Is the Marine Corps ready to operate effectively in an NBC environment?" The subjective opinion of the authors, based on over 21 years of Marine Corps experience, is that the Fleet Marine Forces are not presently ready for NBC combat operations.

Readiness, like effectiveness, is not easy to define. In a general sense it can be described as the potential of combat organizations to achieve their mission. An example, which is an indication of the level of NBC defense readiness, is the length of time it would take to deploy combat forces and engage an enemy, and how long combat could be sustained under NBC conditions. Thus defined, readiness will depend on the quantity and quality of resources available in peacetime, as well as the capability to meet the expected surge in demand that would result from sustained combat. All those activities (training, personal assignment, logistic support, base/station operations, and Headquarters) which are vitally important to readiness must reach an agreement on how much of each is required to ensure the level of readiness necessary for organic support and survivability.

Within the FMF, one of the major problems lies in the lack of both physical training facilities and personnel

required to effectively train Marines in NBC defense. The training facilities at the four FMF NBC defense schools are inadequately funded and poorly maintained, not due to a lack of attention of the respective school staffs, but because of the low priority placed on the entire NBC defense program. This lack of emphasis permeates most units and organizations and has the long-run effect of degrading the training offered at the NBC defense schools and disillusioning OF 57 personnel. The latter is reflected in the low esteem held of the NBC defense field by most officers today; this partially created by the assignment of mandatory NBC defense requirements and, in a lesser manner, due to unpleasant individual experiences in previous NBC defense training (i.e., the mandatory removal of the FPM during gas chamber exercises in order to receive the effects of RCA CS and appreciate the protection the FPM affords its wearer, and the blister agent (HD) indoctrination exercise using a live HD solution conducted in pre-1970 NBC defense schools).

The use of live chemical agents in training is severely restricted in most areas and prohibited in many locations. Restrictions placed on FMF organizations overseas, particularly in Japan, force the majority of operations to simulate enemy chemical agent employment through the use of smoke grenades, and actual riot control agents are used only under controlled conditions (gas chamber exercises). The infantry battalions issue the FPM to all personnel as part of their individual gear issue; the majority of Marine Aircraft Wing personnel, however,

rarely see a FPM outside of their annual service rifle firing requirement while wearing a FPM. On a recent major operation, a FMF squadron deployed without taking any item of NBC defense equipment, all of which remained in the squadron warehouse awaiting the forthcoming FMF PAC Inspection Team.

Because of the lack of realism associated with simulating an NBC condition during operations, in most cases NBC defense is either excluded from operation or exercise play or is ignored in toto. Exclusion of NBC defense from operational play is effectively employed by writing a NBC defense annex which acknowledges the enemy capability in NBC warfare but which discounts any potential use during the operational scenario.

A senior Marine, who has been involved in the Marine Corps NBC defense field since its inception in 1953, had this comment on NBC defense readiness: "At this point in time, it would be inappropriate (if not obscene) to comment on our ability to meet a Russian NBC threat. We have to be honest enough to admit to ourselves that we are sorely lacking in proper training and sufficient funding to effectively carry out our assigned mission."

		<u>OFFICERS</u>	<u>SNCOs</u>	<u>ENLISTED</u>	<u>TOTAL</u>
1976:	1st MARDIV	17	6	154	177
	2d MAW	6	0	184	190
	3d MAW	50		209*	259
	FMFLANT	<u>81</u>	<u>—</u>	<u>424*</u>	<u>505</u>
	Total	<u>154</u>	<u>6</u>	<u>971</u>	<u>1,131</u>
1977:	1st MARDIV	20	12	111	143
	2d MAW	7	6	274	287
	3d MAW	17		115*	132
	FMFLANT	<u>68</u>	<u>—</u>	<u>354*</u>	<u>422</u>
	Total	<u>112</u>	<u>18</u>	<u>854</u>	<u>984</u>

* SNCOs included with enlisted graduates; percentage estimated less than 10 percent.

Table VIII - FMF NBC Defense School Graduates
(1 January 1976 to 15 August 1977)

School	FMFLANT	1st MARDIV*	2d MAW	3d MAW*
Length (days)	13	15	10	15
<u>ENTRY/ADMIN PROCEDURES</u>	(Hours)	(Hours)	(Hours)	(Hours)
Check-In/Introduction	5.5	7.0	3.5	4.0
FPM/GCX	5.0	5.0	3.0	3.0
PT	5.0	5.0	-	-
Admin Time/Field Day	4.0	2.0	2.5	6.5
<u>NUCLEAR</u>				
Nuclear Defense Instruction	24.5	45.0	21.0	36.0
Quizzes & Critiques (No.) (2)	1.0	(3) 1.5	(1) 0.5	(3) 1.5
Exam & Critique (No.) (1)	1.5	(1) 1.5	(1) 0.5	(1) 1.5
<u>BIOLOGICAL</u>				
Biological Defense Instruction	7.5	11.0	8.0	7.5
Quizzes & Critiques (No.) (1)	0.5	-	(1) 0.5	-
Exam & Critique (No.)	-	(1) 1.0	(2) 2.0	(1) 1.5
<u>CHEMICAL</u>				
Chemical Defense Instruction	29.0	35.0	19.0	29.0
Quizzes & Critiques (No.) (2)	1.0	(3) 1.5	(1) 0.5	(3) 1.5
Exam & Critique (No.) (2)	5.0	(1) 1.5	(1) 0.5	(1) 1.5
<u>EXIT PROCEDURES</u>				
Final Exam & Critique	-	8.0	-	2.5
Summary	1.0	-	-	4.0
Graduation & Checkout	<u>5.5</u>	<u>1.0</u>	<u>2.5</u>	<u>3.0</u>
Total Hours	96.0	126.0	64.0	103.0

* These courses provide the same function as Monitor/Survey and Decontamination courses for unit training purposes.

Table IX - Curricula Analysis of FMF Monitor/Survey and Decontamination Courses

School	FMFLANT	3d MAW
Length (days)	19	20
<u>ENTRY/ADMIN PROCEDURES</u>	(Hours)	(Hours)
Check-In/Introduction	5.5	3.5
FPM/GCX	4.0	3.0
PT	8.0	-
Admin Time/Clean-up	4.5	11.0
Field Day	2.5	-
	<u>24.5</u>	<u>17.5</u>
<u>NUCLEAR</u>		
Nuclear Defense Instruction	37.0	52.0
Quizzes & Critiques (No.) (2)	1.0	(4) 2.0
Exam & Critique (No.) (2)	3.0	(1) 2.5
	<u>41.0</u>	<u>56.5</u>
<u>BIOLOGICAL</u>		
Biological Defense Instruction	7.5	6.5
Quizzes & Critiques (No.) (1)	0.5	-
Exam & Critique (No.) (1)	1.5	(1) 1.0
	<u>9.5</u>	<u>7.5</u>
<u>CHEMICAL</u>		
Chemical Defense Instruction	28.0	21.5
Quizzes & Critiques (No.) (1)	0.5	(5) 3.0
Exam & Critique (No.) (2)	5.5	(1) 1.0
	<u>34.0</u>	<u>25.5</u>
<u>EXERCISES/EXIT PROCEDURES</u>		
Exercises	14.5	17.0
Final Exam & Critiques (No.) (2)	8.0	(1) 4.5
Graduation & Checkout	5.0	3.0
	<u>28.0</u>	<u>24.5</u>
Total Hours	<u>136.5</u>	<u>131.5</u>

Table X - Curricula Analysis of FMF NBC
Defense Officer/SNCO Courses

VII. FMF NBC DEFENSE STANDARDIZATION: A PROPOSAL

This final chapter will attempt to analyze the problems that exist within the Marine Corps' NBC defense field and offer recommendations and proposals to implement controls into the current structure. Basically, the present system is weak and lacks the direction, command attention and awareness necessary to make it an effective mechanism within the FMF. The recommendations offered will be of a general nature in order to establish the proper framework from which operations can begin. Once this major obstacle is overcome, specifics may be addressed at the unit level. This establishes some autonomy and direction for field commanders yet will avoid the wide apathy, disparity, and non-compliance that exists today.

A. FMF NBC DEFENSE SCHOOL STANDARDIZATION

The first areas of standardization to be explored are the monitor/survey and decontamination course and the NBC Defense Officer/SNCO Course. Chapter V delineated the purpose, location, and general characteristics of each type of school. No attempt was made, however, to draw any inference or correlation among the schools in question. The main reasons for this omission were the incongruities existing within the four schools which purport to accomplish the same objective.

1. Monitor/Survey and Decontamination Course

Upon receipt of the respective curricula from the four FMF NBC defense schools, a comparison was attempted. It was immediately noted that there were few common characteristics but the differences were quite pronounced. The actual matrix which was formulated (Table IX) had to be expressed in the most general of terms to cover every aspect in each of the four schools. The course lengths varied from 10 to 15 instructional days, and the course titles were as varied as the number of schools presenting them. While the basic reference texts were the same for each school, the actual material being taught could not be fully determined. Subcourse material varied greatly within each respective school's lesson plans which supposedly covered identical subject matter. It was impossible to discern the actual emphasis placed within each area of instruction, although it was readily apparent that more time was devoted to nuclear than chemical defense in three of the four schools.

The monitor/survey and decontamination courses are not designed to make an NBC Defense Specialist out of its graduate, but rather to train him to function effectively as an organization or unit NBC defense team member. As a result, the instructional technique in a school of this type should be directed towards a "hands on" learning process. The present trend within existing monitor/survey and decontamination courses is to offer as much material as possible, often forgetting the goal of the course is to train the Marine in

monitor/survey and decontamination procedures only, and not to function as an NBC Defense Specialist. This is evidenced in the "school creep" wherein the original courses were planned to be only ten days in length; today only one of the four schools has not extended past this course length. Performance oriented training (such as that offered at the MCRD wherein the trainee performs the desired function under supervision) has proven an effective vehicle for disseminating basic skills in new subject matter. The student performance objective (SPO) tells the learner exactly what he must be able to do to demonstrate that he has absorbed what was intended. It also tells him how well he has to perform and under what conditions. The ability or inability to perform can be easily verified; here the quality of feedback, not the quality of instruction, is the issue. Concurrently, the quality of instruction will improve with the quality of the feedback. It is recommended that all monitor/survey and decontamination courses implement performance oriented training in their immediate curricula, as well as within the new proposed curricula.

The course of instruction should not be designed in a high pressure, turnstile atmosphere where the only criteria for performance is to maximize the number of graduates in the shortest period of time. It should be a true learning device whereby Marines are taught the mechanics of team and individual NBC defense. In light of this belief, it is also recommended that a course length of ten instructional days would provide

adequate time to cover the required material. This contrasts with the U.S. Army's school proposal of seven days (Chapter III) of a more intensified training program. The recommended course of instruction for all monitor/survey and decontamination courses is provided in Table XI. It is presented in general terms to conform with and offer comparison with the existing school curricula (Table IX).

The proposed school curricula would commence formal classes on 1300 Friday and terminate two weeks following at 1130. This would allow adequate time in the respective mornings and afternoons for travel to and from the school and for check-in and check-out procedures. The actual instructional time would be approximately 70 hours. Formal instruction would be from 0800 until 1130 and from 1300 to 1630 daily. There would be an 0745 formation and muster and a lunch period from 1130 to 1300, allowing adequate time for travel to and from messing facilities.

2. NBC Defense Officer/SNCO/Enlisted Course

The two NBC Defense Officer/SNCO courses presently offered at the FMFLANT and 3d MAW NBC Defense Schools are fairly uniform in length and overall structure but differ in their internal organization (Table X). Course titles for the same material are once again dissimilar, and the method of presentation and allocation of time also varies. The need for standardization among the "identical" schools is very evident.

Whenever this course is discussed, the question of a secondary MOS 5702 or MOS 5711 arises. Both schools provide instruction that is Marine-oriented and, in most respects, better preparation for Marine Corps NBC defense assignments than the U.S. Army school. This is attributable to the elimination of non-applicable classes presented in the U.S. Army school which cover subjects not required by the Marine Corps (flamethrowers, U.S. Army-peculiar equipment, techniques, and supply procedures) and conversely by the fact the U.S. Army school does not cover equipment and techniques the Marine Corps has adopted. In their present form, it is believed that a secondary MOS 5702 or MOS 5711 should be granted to all officers/SNCO/enlisted graduates from either Marine Corps school. There are obviously some very definite advantages to this proposal, the most prevalent being the provision of recognized (i.e., via a secondary MOS designation) schooling while eliminating the costs involved in sending Marines TAD to the U.S. Army school to receive the MOS designation. The granting of a primary MOS 5702 or MOS 5711, however, is not recommended at this particular time because of the inconsistencies in training facilities, overall instructional expertise, and lack of standardized POIs within both schools. Until the Marine Corps is willing and able to make a commitment in the field of NBC defense schooling, it is in the best interest of the Marine Corps to continue to train its NBC Defense Officers, who must fill a primary MOS 5702 billet, and NBC Defense Specialists at the U.S. Army school. To do otherwise

would degrade even further our already questionable NBC defense capabilities.

It is recommended that each school's emphasis be shifted from that of providing continuous four-week courses on a month-to-month basis to analyzing instead their own command requirements. Within the largest commands, proper utilization of two officer courses and two combined SNCO/enlisted courses would fulfill all command needs for NBC Defense Officer billets and NBC Defense Specialist billets, even if U.S. Army school graduates are not available. It has also been found that the educational variance is generally too wide to allow combined officer/SNCO courses without seriously limiting the progression of course material at an overall even flow. Unless an organization specifically so desires, SNCO training is not required for the existing billets within unit NBC defense teams. The low number of SNCOs actually attending either school (provided in Section B of this chapter) reinforces this recommendation.

Reallocation of the time presently devoted to the three and four-week courses to two-week monitor/survey and decontamination courses would greatly contribute to the goal of training adequate numbers of unit NBC defense team members; two monitor/survey and decontamination courses can be substituted for each four-week course which is eliminated. Only in this way will our existing schools be capable of providing an adequate number of school-trained personnel as required by both MCO 3400.3 and of necessity, if a viable unit NBC defense

capability is to be a factual goal within the FMF. Our existing approach, using the 3d MAW NBC Defense School as an example, provides an inadequate number of overtrained unit NBC defense team members. Presently offering two 20-day and ten 15-day courses each year, and assuming a consistent class population of 20 students per class, a maximum of 240 graduates can be realized in one year. Under our proposed approach, 80 officers and enlisted Marines still complete the 20-day course, but 320 Marines would graduate from the monitor/survey and decontamination course. This provides the 3d MAW with a total of 160 additionally trained NBC defense team members each year.

A generalized school curricula (Table XII) proposes a school length of 20 instructional days with a total instructional time of 140 hours. The proposed time frame for daily instruction is identical to that of the proposed monitor/survey and decontamination course.

3. NBC Defense Refresher Course

The U.S. Army Training Effectiveness Analysis (Chapter III) demonstrated the loss of proficiency and knowledge degradation over time within the U.S. Army NBC field. As the majority of primary MOS 5711 Marines are not fully utilized in their specialty except for required training and immediately prior to NBC defense inspections, their MOS proficiency is also suspect. It is strange that no formal NBC defense refresher course has ever been provided for OF 57 Marines. Such a course is necessary to provide an updating within the field and

reinforce basic knowledge acquired in initial NBC schooling. It is recommended that such a course be presented twice a year, and that the course length be between three and five instructional days. Course attendance would be mandatory for all primary MOS 5711 Marines at one session per year. This training would cover new equipment, lessons learned, policy implemented or introduced during the previous twelve months, new training approaches or devices (films, GTAs, handouts and lesson plans), and participation and training in a Control Center Team exercise. Past experience with attempted refresher training courses indicates that the approach will fail unless the assignment of all primary MOS 5711 personnel is directed from the Division/Wing Headquarters level.

4. Summary of FMF NBC Defense School Standardization Proposals

It is realized that there may be idiosyncrasies present in each of the commands and their respective NBC defense schools which might alter the proposed course lengths and sequencing schedules. In order to establish a system of standardization, an interest must first be generated and steps initiated at Headquarters, Marine Corps to convene a symposium of Marine Corps educators and NBC defense school personnel. The major issue to be resolved would entail the standardization of all facets of current Marine Corps NBC defense schooling, and the implementation of a standardized NBC defense refresher course curricula. This would include agreement

on the course length, proper sequence of courses, uniform POIs, and instructor training procedures.

B. FMF NBC DEFENSE TRAINING STANDARDIZATION

Historically, the majority of casualties attributable to NBC warfare have been due principally to a lack of troop training, indoctrination, and discipline as opposed to the effectiveness of the agents and skills of enemy employment. It is postulated by the authors that the present Marine Corps NBC defense training program lacks the direction and substance required to provide units trained in NBC defense matters fully capable of operating within an NBC environment.

NBC defense training is presented throughout the formal training spectrum of the Marine Corps; entry-level training for both enlisted Marines and officers provides a basic introduction to NBC defense and its associated peculiarities. Post entry-level training provides each Marine with skills, knowledge, and attitudes necessary to the unit mission. Essential subjects mastery is but one part of the training required to ensure optimal survival on the battlefield; the mission-oriented training which is conducted by unit commanders must integrate all available knowledge and skills, and provide the leadership so vital to mission accomplishment. It is at this stage that the Marine Corps NBC defense training program falters. In actual organization training and operations, no other subject receives more lip service than NBC defense.

To provide qualified instructors and personnel for the Marine Corps, each Marine must receive the training and

background knowledge to set the stage for his endeavors within his respective occupational field. As it is currently organized, only U.S. Army Ordnance Center and School graduates are considered qualified to provide NBC defense training for Marines. An examination of recent Marine Corps utilization of this school shows a decline in usage over recent years, particularly in light of the relatively stable T/O and size of Marine Corps organizations. Table XIII provides total Marine Corps participation at the U.S. Army Ordnance Center and School beginning in July 1970.

An interesting factor in discussing OF 57 is that the field depends solely on lateral moves for its manpower base. The OF 57 monitor at Headquarters, Marine Corps, is a Gunnery Sergeant holding an Intelligence (OF 02) MOS. He serves as the monitor for approximately 750 OF 02 Marines and for the approximately 275 OF 57 Marines. As T/O billets in OF 57 are provided only for the ranks of Corporal (E-4) through Master Sergeant (E-8), a void within the field exists on each end of the grade scale. For the OF 57 Gunnery Sergeant, future promotion depends highly on his capabilities in areas other than OF 57, thus a high migration toward redesignation as a First Sergeant (E-8) occurs wherein a reasonable promotional opportunity exists to Sergeant Major (E-9). There is no recruit input to the school, and therefore no continuity of training or background within the field among junior Marines. Lateral moves into OF 57 are normally Corporals or Sergeants who reenlist under a school option. According to the OF 57 Enlisted

Monitor, upon completion of MOS 5711 training, the new trainee is then transferred to a Monitored Command and assigned as to duty station only.

Marines who reenlist under the Selective Reenlistment Bonus Program (SRBP) are assigned to an MOS 5711 billet (with certain exceptions authorized by CMC) for their entire enlistment. Those Marines who graduate from the U.S. Army Ordnance Center and School are assigned to an MOS 5711 billet for a minimum of one year immediately following school. Marine Corps directives provide adequate policy guidance concerning assignment of Marines. These policies, in effect, require the Commanding General or Commanding Officer to assign the Marine with MOS 5711 to a billet where his training will (theoretically) be utilized. Once assigned to such a billet, however, the Marine may find that his "other" duties restrict the time he can allot to NBC defense duties. It is the experience of the authors that such is the case in the majority of MOS 5711 assignments within both battalion and squadron organizations. There is no set policy of assignment for the OF 57 Marine with the exception of assignment to the Western Pacific (WESTPAC) area, where he will be rotated as an OF 57 to fulfill WESTPAC requirements. For a fortunate few Marines, assignment to a Marine NBC defense school provides the opportunity to reinforce his previous knowledge and training and stay abreast of current NBC defense developments. It is here that his knowledge is transferred to student trainees.

A recommended approach to NBC defense training is to remove the subject from the training schedule as a separate entity and force its integration with other subjects and unit training. Implementation in such a manner would demand a cognizant attitude and NBC defense equipment familiarity and usage would become second nature. The use of all available NBC defense equipment on every field exercise, with particular emphasis placed on the FPM, would provide first hand knowledge of the capabilities and operating limitations and restrictions associated with all NBC defense items. This approach would also greatly influence existing attitudes towards NBC defense training.

Of all the basic essential subjects, NBC defense appears to be equally weighted. However, NBC defense is now limited to classroom application in the majority of units. This need not be so; there are considerable opportunities to employ NBC defense equipment in garrison. Field protective mask drills, inspections, and physical training while wearing the FPM are all viable alternatives to canned classroom presentations. Battalion or squadron field meets can incorporate events which are performed while wearing the FPM. Each has the dual purpose of maintaining consciousness regarding the importance of NBC defense equipment and re-emphasizing the breathing, communications, movement, and sight restrictions while undergoing strenuous physical exercise.

Every commanding officer should be concerned with his unit's NBC defense capabilities, and simulating NBC operating

conditions in the field will enable him to observe the effects that usage of NBC defense equipment places on alertness, communications, stamina, and weapon accuracy of his Marines. Problems encountered in the field, particularly in such areas as non-functional equipment and improper care, fitting, and maintenance of the FPM, cannot be resolved on the battlefield. The actual use of CS by aggressor forces will rapidly sharpen masking discipline and simultaneously place a dependency upon the benefits derived from proper FPM care and maintenance. The short-lasting field effects of CS are ideal for exercise employment without the accompanying liability of serious personal injury.

The integration of NBC defense training into field exercises and operations should pose no major problem for ingenious Marines. This requires only the consent of higher headquarters and an honest critique following the use of any NBC scenario introduced into any operation to remedy any shortcomings. The major excuse for not implementing such exercises in the past has centered on preparation for low- or mid-intensity conflicts where no NBC capabilities are expected; this argument is no longer valid. The argument that the arbitrary introduction of NBC warfare into training exercises eliminates or reduces member participation throughout the remainder of the exercise is nothing less than total realism in the preparation for potential Marine operations. The incorporation of realistic NBC conditions can be assisted through the use of simulant chemical agents to complement riot control agent use.

Certain training areas can be established expressly for NBC related exercises. The installation of chemical agent detection stations will test the immediate proficiency of Monitor/Survey Team members. Biological samples can be taken and properly labeled for simulated laboratory analysis. Chemical decontamination can be practiced by unit Decontamination Team members, either using existing NBC defense school facilities or through the establishment of a unit decontamination area and personal decontamination station. Control Center team exercises can be conducted both in garrison and in the field, and required reports and communications can be relayed using organic communications equipment.

Implementation of NBC defense training into field training exercises would do much to provide a more realistic battlefield for potential engagements. Those training exercises contained in FM 21-48 can be readily implemented to provide this realism. It is recommended that the Marine Corps Air-Ground Combat Training Program at MCB 29 Palms, California, establish a pilot program to fully implement such an exercise for battalion/squadron participation. Only through realistic training can the desired unit NBC defense team and member cohesion be achieved.

The requirement for a monthly NBC defense training period will maintain the awareness and cultivate the interest necessary to successful unit NBC defense operations. In short, all Marines must be able to shoot, move, and communicate while wearing NBC defense equipment. Marine Corps Bulletin 3400 of 27 June 1975 recently advised FMF commanders to include the use of NBC protective equipment in training whenever possible.

Suggestions included field exercises, the continuance of regular maintenance operations, and limited physical training. This bulletin provided the initial guidance and impetus for the start of a coherent program, but subsequent events, exercises, and the lack of a strong NBC defense inspection program have thus far failed to support this effort.

A related problem concerns Marines assigned to unit NBC defense teams. Unfortunately, although through no fault of their own, the majority of Marines trained in the semi-formal NBC defense schools have less than one year remaining to serve prior to separation from the Marine Corps. This phenomena is one of assigning only those "expendable" Marines to the various assigned school quotas. This is particularly true within the Marine Aircraft Wing where highly skilled junior-ranking Marines are considered indispensable. As a result of this practice, a constant turnover is perpetuated for NBC defense team assignments and training.

Another area which will impact upon Marine NBC defense training is the updating and revision of FMFM 11-1, Nuclear, Chemical and Defensive Biological Operations in the FMF. MCDEC, charged with the revision, would do well to examine the format and presentation contained in U.S. Army FM 100-5, Operations, which presents an easily understood training manual for use by the enlisted soldier. Adapting this format to a small-unit approach would provide a much-needed reference for unit NBC defense matters and for implementing NBC defense into mission-oriented training.

C. FMF NBC DEFENSE OPERATIONS STANDARDIZATION

Situations where Marines are engaged in an amphibious assault in a nuclear war, are required to maneuver while contending with contaminated terrain, or are confronted with the possibility of a tactical nuclear preemptive strike are as plausible as the Soviet threat is real. Yet, in light of these potential dangers, our current training does not reflect any emphasis on fighting a war of movement within an NBC environment.

The NBC Defense Annex of a standard operations plan for any major exercise deals with the employment of NBC weapons. Invariably, for the vast majority of operations, this annex states that the use of NBC weapons will not be considered in the play of the problem. Considering that the professed doctrine of the Soviets is to use chemical and nuclear weapons in a major conflict, this seems to present a paradox. Even if the avowed purpose of such training is to prepare Marines for NBC warfare conditions, such recent operations as the rescue of the S.S. Mayaguez and operations on Koh Tang Island proved that Marines have to be prepared to operate in the presence of riot control agents at a minimum. Where does this leave the Marine Corps in regard to its ability to perform in a major war where NBC weapons are in the play of the problem?

As was noted in the previous section, NBC defense training must be thorough and, as a corollary, so must be the integration of NBC defense into operations. Field exercises

offer the device whereby the tools of NBC defense trade can be used and the benefits of proper NBC defense training realized. To have one without the other will contribute to a lack of unit coordination and a severely degraded performance under actual NBC combat conditions.

The Marine Corps' failure to realistically plan for operations utilizing the concepts of NBC warfare has led to undue optimism in assessing our offensive capability. Marines may very well one day face the Soviet/Warsaw Pact Forces that General George S. Brown, Chairman of the Joint Chiefs of Staff, conceded in his Fiscal Year 1978 Posture Statement: "... are the best equipped and prepared forces in the world to employ chemical weapons and to operate under CBR warfare conditions." To ignore this threat and continue to remain oblivious to their demonstrated NBC capability is to court disaster in the face of the numerically inferior and out-gunned NATO Forces. Commanders who have not yet allowed their Marines to encounter the cumbersome and restrictive movement imparted by NBC defense equipment, particularly when under strain or duress, had best begin their preparedness if they wish to successfully accomplish their assigned mission in future conflicts.

D. FMF NBC DEFENSE INSPECTION STANDARDIZATION

The present structure of the major inspection programs conducted within the Marine Corps does not provide the unit commander with the proper incentives to perform NBC defense training on a consistent basis. It appears that NBC defense lectures, essential subjects testing, and gas chamber exercises

are performed only to meet requirements and establish "filler" in each Marine's individual training record, rather than actually provide the training required to ensure combat survivability under NBC conditions. The NBC defense ready locker and equipment locker are inspected only for actual content and compliance with radiac instrument calibration requirements. Decontamination equipment is often inspected in its original packing. The practical skills and professional knowledge possessed by individual Marines is not explored and the paper-work drill is perpetuated.

In order for an inspection team to accomplish its assigned task, it must be able to realistically evaluate units in the performance of the unit's assigned mission. Past inspections have confirmed the fact that as long as a unit "looks good on paper" the ultimate result of the inspection will be a grade of satisfactory or higher. The importance of proper paper documentation is not being disputed, but the lack of emphasis on the practical aspects of NBC defense is questioned. This may seem to imply a reversion to the Operational Readiness Inspection (ORI), but that does not necessarily have to be the case. As an example, a list of NBC defense team members could be provided to the inspection team. A random selection of team members for testing, either oral, practical, or written, will provide a true measure of actual NBC defense capability and knowledge. This may appear to encompass more detail and time than is available during a relatively short inspection period, but this can be readily accomplished by an experienced

NBC defense inspector. Commands are usually too involved with some other aspect of training or operations and profess not to possess the necessary expertise to accomplish required NBC defense training. Consequently, rather than being a continuous and consistent training vehicle, the respective NBC defense programs have been degraded to minimum effort projects devoted to minimal satisfaction of the cyclical inspection requirements.

NBC defense inspections must be redesigned in order to redirect these attitudes and actions. This must begin at the IGMC level. Unit commanders respect what is inspected, and the intensity of each inspection sets the stage for all subsequent unit inspection activity. Such inspections should be aligned with existing command guidance in the NBC defense field, namely, practical application of team member knowledge, NBC Defense Officer and NBC Defense Specialist proficiency, unit training programs, and maximum available use of NBC defense equipment during field exercises and operations.

E. STANDARDIZATION SUMMARY AND CONCLUSIONS

This thesis has surveyed the NBC training program and operational environment that are both exogeneous to and indigenous to the Marine Corps. It does not attempt to address those important NBC-related problems which fall outside of Marine Corps purview, such as the anticipated lack of adequate medical support which is to be provided by the U.S. Navy. Such a report is outside the realm of this thesis. Instead, the strengths of the enemy and inherent weaknesses of the

existing system were highlighted only to emphasize the overwhelming realization that the Marine Corps needs to acquire a new direction in NBC defense training, operations, and inspections in order to operate effectively within an NBC environment.

The Commandant of the Marine Corps stated in April 1977, "Operational readiness is the key. All major commands are now substantially ready for combat, and the Corps is prepared today to demonstrate that readiness whenever called." General Wilson's assessment of the overall situation attests to the fact that the Marines are ready to perform their assigned mission. The Marines have probably never been so well trained, equipped, or prepared during any other peacetime situation. But, as in practically every structure, there exists a weak link, or modern-day Achilles' heel, and in the opinion of the authors, the Marine Corps' is NBC defense.

The Marine Corps is presently at a state of readiness where the immediate implementation of a viable NBC defense program could be initiated with relative ease. The concept of centralized control, however, must provide the overriding theme. To facilitate command attention and handling of all Marine Corps NBC defense matters, steps must also be taken to create an NBC position wherein direction can be administered at Headquarters, Marine Corps.

It is recommended that an NBC Defense Officer be assigned to the Operations and Training Department of the Policies Division (Code POL), Headquarters, Marine Corps. The Director,

Policies Division, assists the Deputy Chief of Staff (DC/S) for Plans and Policies in the coordination, review, and development of Marine Corps policies with respect to Marine Corps roles, mission, function, structure and command relationships, providing assessments of the consistencies of such proposals with existing policies and directives. He additionally serves as the Executive Assistant to the DC/S for Plans and Policies. The Marine Corps has both a mid-range and long-range plan for where it wants to go; it is time that NBC defense be implemented in this plan. The NBC Defense Officer thus assigned would be in a position of planning and coordination, and would provide a point of contact and "sounding board" for all Marine Corps NBC defense matters, a position that is not in existence today. While the proposed billet would be concerned primarily with NBC defense, it would be advantageous to have this officer also hold MOS 5715, and coordinate those related items of Nuclear and Chemical Warfare Employment (N&CWE) interest and concern. He would additionally serve as a coordinator for IGMC inspections in the area of NBC defense.

It is recommended that the IGMC incorporate an immediate capability to inspect and enforce existing NBC defense directives. This will set the tone for subordinate inspections and provide a stepping stone to future NBC defense endeavors for the entire Marine Corps.

A recent Marine Corps Liaison Officer to the U.S. Army Ordnance Center and School stated, "One of the most frustrating

experiences for those Marines who attend courses here is the lack of concern and attention they find in their units when they return with the knowledge and information they have learned." Career motivation seriously wanes upon their discovery that they will serve as Training NCOs in their S-3 Sections until a major inspection approaches, and only then are they relinquished to devote all their time and energies to NBC defense matters.

Marine Corps Bulletin 1220 of 9 December 1976 and 27 June 1977 provides a realistic indicator of current job satisfaction among junior OF 57 Marines. For the six-month periods ending 30 September 1976 and 30 April 1977, the field was short Lance Corporals through Sergeants, balanced in Staff Sergeants, over in Gunnery Sergeants, and balanced in Master Sergeants. The annual OF 57 reenlistment goal has been established at 147; for the respective six-month periods, four reenlistments during the first period and 27 reenlistments during the second period provided 2.7% and 18.4% of the desired reenlistments. Of 40 OFs within the Marine Corps, OF 57 was ranked 39th in reenlistments. Only OF 46 (Photography), a relatively small OF, had registered a lower reenlistment percentage (18.0%).

The Fiscal Year 1977 Warrant Officer Selection Board selected one MOS 5711 Master Sergeant for promotion to WO-1. Upon promotion during January 1978, he will be assigned MOS 5702 as a primary MOS. It is opined that increased utilization of superior MOS 5711 Marines in a Warrant Officer capacity

would greatly bolster the OF 57 image and correspondingly contribute to increased NBC defense readiness and effectiveness.

This thesis would not be complete without emphasizing once again the foremost problem associated with NBC defense in the Marine Corps today: attitude. Not only is it prevalent among officers and enlisted alike, it is also the most difficult to correct. If this deficient command interest is not redirected to the areas of threat analysis, inherent dangers, and the ultimate results of non-compliance with NBC procedures and regulations, the consequences may become too apparent when actual NBC conditions are encountered by Marine Corps units. General Wilson's observation that "true readiness ultimately rests upon the quality and motivation of our personnel" may well prove the determining factor in the future of Marine Corps units in combat, and particularly within an NBC environment.

PROPOSED FMF MONITOR/SURVEY AND DECONTAMINATION COURSE

Length of School	10 Days	
Topic	(Hours)	
<u>ENTRY/ADMIN PROCEDURES</u>		
Check-In/Introduction	5.5	
FPM/GCX	3.0	
PT (1630-1700 MWF)	2.5	
Admin Time (1630-1700 Tuesday)/Field Day (1630-1700 Thursday)	2.0	<u>13.0</u>
<u>NUCLEAR</u>		
Nuclear Defense Instruction	20.0	
Quizzes & Critiques (3 @ .5 Hr)	1.5	
Exam & Critique	2.0	<u>23.5</u>
<u>BIOLOGICAL</u>		
Biological Defense Instruction	5.5	
Quizzes & Critique (1 @ .5 Hr)	0.5	
Exam & Critique	1.0	<u>7.0</u>
<u>CHEMICAL</u>		
Chemical Defense Instruction	20.0	
Quizzes & Critiques (3 @ .5 Hr)	1.5	
Exam & Critique	2.0	<u>23.5</u>
<u>EXIT PROCEDURES</u>		
Final Exam (Practical)	3.5	
Final Exam & Critique	3.5	
Graduation & Check-out/Course Critique	2.5	<u>9.5</u>
Total Hours		76.5

Table XI - Proposed FMF Monitor/Survey
and Decontamination Course

PROPOSED FMF NBC DEFENSE OFFICER/SNCO/ENLISTED COURSE

Length of School	20 Days	
Topic	(Hours)	
<u>ENTRY/ADMIN PROCEDURES</u>		
Check-in/Introduction	5.5	
FPM/GCX	3.0	
PT (1630-1700 MWF)	5.0	
Admin Time (1630-1700 Tuesday) Field Day (1630-1700 Thursday)	4.0	<u>17.5</u>
<u>NUCLEAR</u>		
Nuclear Defense Instruction	52.0	
Quizzes & Critiques (5 @ .5 Hr)	2.5	
Exam & Critique	2.5	<u>57.0</u>
<u>BIOLOGICAL</u>		
Biological Defense Instruction	7.0	
Quiz & Critique (1 @ .5 Hr)	0.5	
Exam & Critique	1.0	<u>8.5</u>
<u>CHEMICAL</u>		
Chemical Defense Instruction	30.0	
Quizzes & Critiques (5 @ .5 Hr)	2.5	
Exam & Critique	1.5	<u>34.0</u>
<u>EXIT PROCEDURES</u>		
Exercises & Review	21.0	
Final Exam & Critique	4.5	
Course Critique/Graduation & Check-out	3.0	<u>28.5</u>
Total Hours		145.5

Table XII - Proposed FMF NBC Defense Officer/
SNCO/Enlisted Course

MARINE GRADUATES AT THE U.S. ARMY ORDNANCE CENTER AND SCHOOL
FY 1971 THROUGH FY 1978 (PROJECTED)

<u>Fiscal Year</u>	<u>CBR Officer Course</u>	<u>CBR Enlisted Course*</u>
1971	36	88
1972	11	69
1973	No figures available	
1974	No figures available	
1975	1	71
1976	1	61
1976T	2	2
1977 (to 19 August)	1	42
1978 (Projected)	6	68

* includes Marine Corps Reserves.

Table XIII - Marine Graduates at the U.S. Army
Ordnance Center and School,
FY 1971 through FY 1978 (Projected)

APPENDIX A

ESSENTIAL SKILLS/TASKS FOR UNIT NBC DEFENSE OFFICERS/NCO'S

1. Recognize types, characteristics, persistency and physiological effects of chemical and riot control agents.
2. Perform first aid for chemical agent casualties.
3. Supervise first aid procedures for chemical and RCA.
4. Recognize technical aspects of biological defense.
5. Recognize factors concerning employment of biological weapons.
6. Take individual/unit defensive measures against biological attack.
7. Recognize the types of nuclear explosions and describe effects.
8. Take individual defensive measures before/during/after nuclear attack.
9. Fit and adjust protective mask.
10. Don, clear, and seat protective mask.
11. Recognize conditions requiring automatic masking.
12. Conduct unmasking procedures.
13. Maintain protective mask/carrier.
14. Use accessories authorized for protective mask M17 series.
15. Conduct mask confidence training.
16. Supervise use of individual protective clothing and equipment.
17. Determine MOPP.
18. Recognize personal needs under MOPP.
19. Perform chemical decontamination of self, clothing, and equipment.

20. Perform biological decontamination of self, clothing, and equipment.
21. Perform radiological decontamination of self, clothing, and equipment.
22. Recognize NBC standards of proficiency (individual, unit, team).
23. Define duties of unit NBC defense personnel.
24. Establish unit NBC teams.
25. Prepare NBC reports.
26. Conduct chemical detection and identification operations.
27. Supervise marking of contaminated areas.
28. Cross chemically contaminated area.
29. Supervise employment of chemical agent alarms.
30. Determine parameters of nuclear strikes.
31. Prepare simplified and detailed fallout predictions.
32. Use radiac equipment (includes OEG).
33. Perform radiological monitoring.
34. Conduct ground radiological survey.
35. Plot NBC 5 messages and contamination overlays.
36. Analyze fallout contamination data.
37. Discuss origin and hazards of neutron-induced radiation.
38. Supervise use of collective protective equipment.
39. Supervise equipment decontamination.
40. Determine requirement for decontaminating equipment.
41. Establish field expedient personnel decontaminating station (PDS).
42. Conduct individual NBC defense proficiency testing.
43. Conduct unit NBC defense proficiency testing.

44. Conduct unit NBC defense training.
45. Advise on flame support of tactical operations.
46. Analyze unit mission to determine smoke support requirements.
47. Prepare NBC annex to unit SOP.
48. Accomplish NBC defense measures at company level.

APPENDIX B

STATISTICAL ANALYSIS

The comparison of the historical and experimental scores (Tables I and II) on each question constitutes a set of paired observations. Also, since the sample sizes are both less than 30, the "t" distribution, with a "single tail" confidence level of 95%, will be used to test the hypothesis that the means are equal.

H_0 : the means are equal

H : the means are not equal

\bar{c} = particular change for each question

c = average change

S_c^2 = estimated variance

$S_{\bar{c}}$ = estimated standard deviation

n = sample size

k = confidence interval

Formulas to be used in analysis:

$$\bar{c} = \frac{c_1 + c_2 + \dots + c_n}{n} \qquad S_c^2 = \frac{(c_1 - \bar{c})^2 + (c_2 - \bar{c})^2 + \dots + (c_n - \bar{c})^2}{n - 1}$$

$$S_{\bar{c}} = \frac{S_c}{\sqrt{n}}$$

$$\bar{c} = k S_{\bar{c}}$$

ENLISTED

$$n = 29$$

$$k = 2.05$$

$$\bar{c} = \frac{-90}{29} = -3.10$$

$$S_c^2 = \frac{2299.08}{29 - 1} = 82.11$$

$$S_c = 9.06$$

$$S_{\bar{c}} = \frac{9.06}{\sqrt{29}} = 1.682$$

$$\bar{c} = k S_c$$

$$\bar{c} = (2.05) (1.682)$$

$$\bar{c} = 3.45$$

$$-3.10 \nmid 3.45$$

\therefore accept H_0 : The means
are equal

OFFICER

$$n = 28$$

$$k = 2.05$$

$$\bar{c} = \frac{15}{28} = .54$$

$$S_c^2 = \frac{4073.47}{28 - 1} = 150.86$$

$$S_c = 12.282$$

$$S_{\bar{c}} = \frac{12.282}{\sqrt{28}} = 2.32$$

$$\bar{c} = k S_c$$

$$\bar{c} = (2.05) (2.32)$$

$$\bar{c} = 4.75$$

$$.54 \nmid 4.75$$

\therefore accept H_0 : The means
are equal

APPENDIX C
COST REDUCTION ANALYSIS

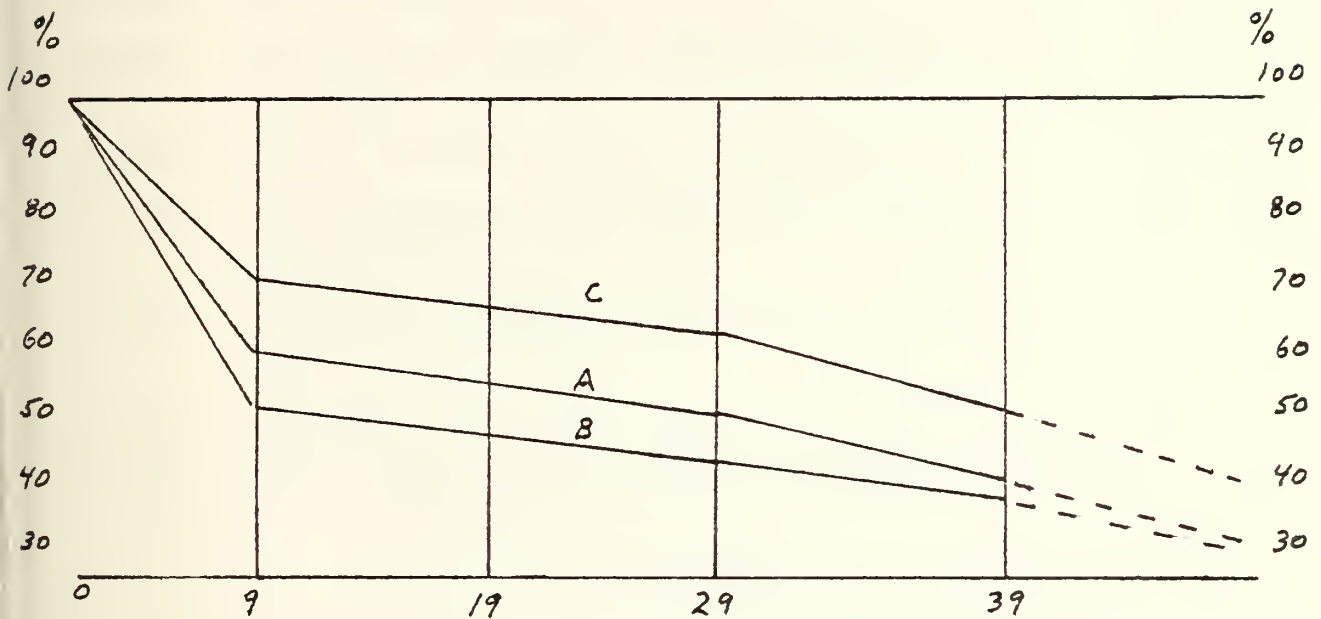
The absolute cost saving for the proposed alternative can be emphasized by use of the regular military compensation (RMC) for the three days of instruction eliminated. The Army Force Planning Cost Handbook and the FY75 student input load were used to compute the total cost saving.

<u>RMC</u>	X	<u>3 DAYS</u>	X	<u>FY75 INPUT</u>	=	<u>TOTAL</u>
E/4/E5	43.37	3		6172	=	\$803,039
01/02	64.27	3		1796	=	<u>346,480</u>
						\$1,149,519

This total does not include the relative cost savings incurred when the faculty RMC and the facilities costs reduction are taken into account. The actual computation of these totals was beyond the scope of this analysis.

APPENDIX D
WRITTEN NBC TEST RESULTS

Personnel Passing



Elapsed Weeks

- A - Sample Group Average.
- B - Group Average - units with little or no NBC training emphasis.
- C - Group Average - units with NBC training emphasis.

APPENDIX E

NBC DEFENSE BILLET DESCRIPTIONS

<u>MOS</u>	<u>MOS Description</u>	<u>DOD Code</u>
5702	Nuclear, Biological and Chemical Defense Officer	2G (111)
*5710	Marine Wing Weapons Unit Officer	4B
*5715	Nuclear and Chemical Weapons Employment Officer	2G
*5720	Ground Nuclear Weapons Assembly Officer	4E
5700	Basic Nuclear, Biological and Chemical Defense Man (MGYSGT-PVT)	494
5711	Nuclear, Biological and Chemical Defense Specialist (MGYSGT-PVT)	494
*5712	Chemical Technical Escort (GYSGT-PVT)	494

Notes: (111) MOS's suitable for assignment as primary for Warrant Officers.

* MOS's to be assigned as additional only.

Assignment of either MOS 5702 or MOS 5711 requires the successful completion of the respective officer or enlisted NBC defense curriculum (four weeks in duration) presented at the U.S. Army Ordnance Center and School, Aberdeen, Maryland. MOS 5702 and MOS 5711 deal directly with NBC defense matters within each organization and provide the backbone of that organization's NBC defense expertise. An examination of the MOS description of each MOS will provide an insight to the scope and depth of knowledge required by MOS 5702 and MOS 5711 personnel.

A. MOS 5702: NUCLEAR, BIOLOGICAL AND CHEMICAL DEFENSE OFFICER
(NBC Def O) (111)

1. MOS Description

a. Summary: Supervises and coordinates operational and technical activities associated with nuclear, biological, and chemical defense.

b. Duties and Tasks: Prepares plans, annexes, and standing operating procedures for nuclear, biological, and chemical defense. Estimates requirements and makes recommendations for procurement and distribution of NBC defense training and exercises. Assists in planning and supervising NBC defense training and exercises, coordinates and supervises NBC defense activities, to include: predictions, detection, evaluation, and monitoring of NBC attacks and hazards, and decontamination of personnel, equipment, material, and areas. Advises commander on vulnerability of own forces to NBC attack. Prepares initial assessment of damage to own forces resulting from enemy NBC attack. In conjunction with medical officer, obtains and evaluates information concerning tactically significant dosages of nuclear radiation received by platoon size or larger units. Advises and assists the intelligence officer in collection, evaluation, and dissemination of information concerning enemy NBC capabilities.

2. T/O Billet Titles

Nuclear, Biological, and Chemical Defense Officer
Radiological Defense Officer
Nuclear, Biological and Chemical Property Officer
Chemical Research Engineer
Nuclear Research Engineer

B. MOS 5711: NUCLEAR, BIOLOGICAL AND CHEMICAL DEFENSE
SPECIALIST (NBC Def Sp1) MGYSGT through PVT

1. MOS Description

a. Summary: Performs duties incident to operation of NBC Element including operation and maintenance of NBC protective equipment, and supervision and training of NBC defense personnel.

b. Duties and Tasks: Performs duties incident to applying detection, emergency and decontamination measures to terrain, equipment, and personnel contaminated by NBC warfare agents. Uses, or supervises personnel engaged in using detection equipment for toxic chemical agents and radiac instruments for measuring radioactive contamination. Detects the presence of chemical agents and makes identification of the agent. Detects the presence of radioactive contamination and measures the radiation intensity. Collects samples for detection, and identification of biological agents. Informs unit commanders of contaminated areas, and suggests routes of passage, supervises or participates in decontaminating affected areas, equipment, and personnel, using portable and power driven decontaminating equipment and protective clothing. Determines by tests when contamination areas or equipment have been rendered harmless. Assists in interpreting information received from monitoring teams to determine the extent of contamination and radiation intensity. Inspects and performs preventive maintenance on chemical warfare protective equipment such as protective masks, collective protectors, and decontamination equipment. Supervises and conducts training in

detection and protection phases of NBC warfare, including operation, employment and care of NBC detection and measuring equipment and decontamination equipment.

2. T/O Billet Titles

Nuclear, Biological and Chemical Defense Specialist.

APPENDIX F

NBC DEFENSE EQUIPMENT AND DECONTAMINATION

The following NBC defense equipment is available for Fleet Marine Force organizations and units, providing a total protection package for any foreseeable NBC contingency.

A. INDIVIDUAL PROTECTIVE EQUIPMENT

All defense measures must consider protection of the eyes, mouth, nose, and skin, as these are the common portals of entry by NBC agents or weapons. Individual protective equipment must provide sufficient protection to enable continuation of the assigned mission and concurrently ensure the optimum probability of survival following any NBC attack. During entry-level training Marines are fitted for Field Protective Masks (FPM) and items of protective clothing, both of which are issued or assigned for individual use, as required, within Fleet Marine Force organizations. Individual protective equipment available in the Fleet Marine Force includes:

1. FPM ABC-M17A1

The FPM ABC-M17A1 provides protection for the wearer's face, eyes, and respiratory tract from field concentrations of all NBC agents in gas, aerosol, and fine droplet form (Tank crewmen use the ABC-M14A2 and ABC-M25/M25A1 series of tank masks and aircraft crewmen use the M24 aircraft protective masks with respective accessories). The FPM ABC-M17A1 is issued in three sizes, small, medium, and large, and is complemented by the following mask accessories:

a. ABC-M6A2 CB Protective Mask Hood

This hood is designed for semi-permanent attachment to the FPM ABC-M17A1 to provide protection to the head and neck from chemical agent vapors or liquid droplets and increases protection to the respiratory tract by minimizing the effects of leakage around the edges of the mask. The eyelenses of the FPM ABC-M17A1 are further protected by a pair of M1 Eyelens Outserts which improve operations in low temperatures.

2. M15A1 Field Protective Mask Carrier

This carrier is made of olive drab cotton duck and is lined with olive drab cotton cloth. It is reinforced at critical locations by plastic material and is provided with four pockets, a shoulder strap and a waist strap. The four pockets are used to carry:

a. Amyl Nitrite Ampules

These ampules are issued from medical sources supply for use in counteracting the effects of blood agent poisoning. Normal issue is one box of 12 ampules.

b. Automatic Atropine Injector

Three automatic atropine injectors are issued from medical sources supply for first aid against nerve agent poisoning.

c. Chemical Agent Detector Paper, ABC M-8

A booklet of 25 sheets of chemical agent detector paper is issued for detection of liquid nerve or blister chemical agents. Instructions for use are provided on the cover of the booklet.

d. M1 Waterproofing Bag

The M1 waterproofing bag is provided to protect the FPM ABC-M17A1 filter elements against dampness. Under field conditions, two bags are issued: one to store the mask in and another to encapsulate the M15A1 FPM carrier and enclosed FPM ABC-M17A1 while crossing water or operating under extreme moisture conditions.

e. Mask Spectacle Inserts

Spectacle inserts are available for all Marines with visual acuity of 20/70 or poorer, and after issue become the personal property of the individual. Regulations for spectacle inserts are contained in U.S. Navy BUMED Instruction 6810.4.

f. Water Canteen Cap

This cap provides the capability of drinking water from the canteen while masked, and is stored in the internal pocket of the M15A1 FPM carrier when not in use.

g. M1 Resuscitation Tube

The M1 resuscitation tube provides the capability of administering mask-to-mouth artificial respiration by a masked individual to an individual casualty in a contaminated atmosphere.

3. ABC-M4 CB Mask Winterization Kit

This kit provides protection against frost accumulation on the inlet valve caps under arctic conditions. It is stored in the internal pocket of the M15A1 FPM carrier when not in use.

4. ABC-M13 Decontaminating and Reimpregnating Kit

This kit is contained in a plastic container equipped with a pull-off plastic lid. It consists of two cloth bags filled with a decontaminating and reimpregnating compound for use in decontaminating individual clothing and equipment and for emergency reimpregnation of the chemical protective liner, gloves, and socks worn in chemically contaminated areas. It also contains a small pad filled with skin decontaminating powder, and a single-edge blade for cutting away contaminated clothing. Any chemical agent that has not penetrated the skin may be decontaminated with the skin decontaminating powder, as may any agent on the skin. This is accomplished by blotting any liquid first with the pad, turning the pad over and slapping it on the skin to release the powder and rubbing the powder over the contaminated area. The FPM ABC-M17A1 may also be decontaminated, either internally or externally, using these procedures. The kit is carried in the large external pocket of the M15A1 FPM carrier.

5. M-2 Leather Dressing, Vesicant Gas Resistant

This is a protective dubbing, provided in a small metal can, that makes leather resistant to penetration by chemical agents. It is applied to boots either by hand-rubbing or via immersion in a melted solution.

6. Chemical Protective Clothing

A complete set of vesicant gas protective clothing (trousers, shirt, pair of gloves and socks) is available for issue to each Marine. Normally, a specified percentage

(usually 10%) of all chemical protective clothing will be kept impregnated at all times. Periodic testing with the ABC-M2 Impregnate-in-Clothing Testing Kit will determine the impregnate content. When required, the stock specified will be reimpregnated using the M3 Field Impregnation Set.

B. COLLECTIVE PROTECTION EQUIPMENT

Some means of collective protection is required to remove chemical and biological agents and radioactive material, in particular form from contaminated air. The ABC-M6 series of Gas Particulate Filter Units provides this capability. These gas driven units are used in conjunction with either a permanent, improvised, or portable sealed shelter. Materials for sealing existing shelters are obtained from respective engineer/utilities units or sections. They provide uncontaminated facilities for the rest and relief of personnel and for command and communications facilities. TM 3-4240-20-17 provides maintenance instructions for the operating and care of M6 units. Structures most likely to be made resistant to NBC agents are those housing command posts, aid stations, communication centers, fire direction centers, and other military activities of similar importance. Equipment necessary to the proper installation and adaptation of the M6 series of filter units are the AN-M1 and M2 Antibackdraft Valve and M1 Air Pressure Regulator. A U-tube manometer is used to determine the overpressure within the shelter and provide both an inside and outside pressure reading.

C. DETECTION AND IDENTIFICATION EQUIPMENT

Rapid detection and identification of chemical agents and radiological material or nuclear contamination is vital to unit survival. At the present time, the Fleet Marine Force does not possess an immediate detection capability for biological agents; samples must be collected in the field and tested in the nearest laboratory to determine if biological agents have been employed by enemy forces. For chemical and radiological/nuclear contamination detection, the following equipment is available to determine the type of contaminant present and the extent of its coverage.

1. Chemical Equipment

a. ABC-M18A2 Chemical Agent Detector Kit

This kit will detect dangerous vapor concentrations of all known nerve, blister, blood, and choking agents, as well as detect residual surface contamination. Detector tubes, tickets, paper and vesicant crayon are used to detect the presence of chemical agents. The presence of a chemical agent is detected by distinct color changes.

b. AN-M15A2 Chemical Agent Detector Kit

This kit possesses all of the component parts of the ABC-M18A2 kit with the exception of those items required to perform tests 5 through 8 of enclosure (8) of the ABC-M18A2 kit and the testing for liquid agents with the M7A1 detector crayon.

c. Vesicant Detector Crayon, M7A1

Used as a separate component from the M18 series of chemical agent detector kits, the M7A1 vesicant detector

crayon is rubbed on equipment or on a piece of paper to detect blister agent contamination. Liquid or high vapor concentrations of blister agents (except the nitrogen mustards) turn the crayon from pink to blue.

d. Chemical Agent Detector Paper, ABC-M8

This liquid detector consists of blotter-like paper impregnated with chemicals which furnish the detection mechanism. Issued in a booklet with 25 sheets per book, or furnished with the ABC-M18A2/AN-M15A2 kits, the ABC-M8 paper provides recognition of G and V nerve agents and blister agents via a distinctive color change on contact with the respective agents.

2. Radiological/Nuclear Contamination Equipment

Radiac instruments are used to detect the presence of radioactivity and measure the dose or dose rate of radioactive contamination following a nuclear accident, detonation, or sabotage by radiological materials.

a. Dose-Rate Meters

Dose-rate meters are radiac-instruments which measure the level of radioactivity in a contaminated area through the electrical collection of ions principle.

(1) IM-174/PD. Radiacmeter IM-174/PD consists of a radiacmeter, housed in a waterproof aluminum case, a vinyl impregnated nylon carrying case with a clear plastic viewing window and belt clip, and a canvas carrying strap. The radiacmeter is normally operated within the carrying case and may be carried by either the shoulder strap or the belt clip. It is the standard high dose rate area survey meter for the

Marine Corps and measures only gamma radiation on two range scales, 0.1 to 10 rad per hour and 0 to 500 rad per hour. It provides accuracy within plus or minus 10 percent and operates from power provided by three mercury batteries, providing up to 150 operating hours, depending on the age, type of storage before use, and climatic conditions during use.

(2) AN/PDR-27. Radiac set AN/PDR-27 series are portable, watertight, battery-operated radiation detectors and indicators. It is capable of detecting and measuring gamma radiation, or with a special beta shield removed, of detecting beta radiation. It is the standard low dose rate radiac instrument for the Marine Corps, and measures gamma radiation in millirad per hour. The large Geiger-Mueller (GM) tube which is housed on the large probe with the attached beta shield can detect and measure gamma radiation with the shield closed or detect beta radiation with the shield open on two range scales; 0 to 0.5 and 0 to 5.0 millirad per hour. The small GM tube housed in the small probe can also detect and measure gamma radiation on two range scales: 0 to 50.0 and 0 to 500.0 millirad per hour. This set is used for monitoring personnel, food, and equipment.

(3) AN/PDR-54/56. This is a portable alpha radiation detector which uses propane gas in its detecting element and reads in counts per minute. It is powered by mercury batteries and normally found in T/E's for organizations possessing a nuclear capability. Its primary use is determining the amount of alpha radiation contamination present following a nuclear accident or radiological sabotage.

b. Dosimeters

Dosimeters are small, portable devices which measure the total gamma radiation dose received by an individual. They require recharging on a near-daily basis to ensure accuracy within plus or minus 10 percent.

(1) IM-9C/PD. The IM-9C/PD is a technical dosimeter used primarily in laboratory work. It measures gamma radiation dosage from 0 to 200 millirad. The PP-354/PD radiac detector-charger is required to recharge the instrument to zero for subsequent usage following any gamma radiation exposure.

(2) IM-143/PD. The IM-143/PD is a tactical dosimeter which measures gamma radiation dosage from 0 to 600 rads. It is normally issued on the basis of one per squad or one per team member of monitor/survey or decontamination teams. The PP-354/PD radiac detector charger is also required to recharge this dosimeter to zero.

(3) Radiac Detector DT-60/PD. The DT-60/PD is the standard dosimeter for the Marine Corps and is issued on an individual basis to each Marine. It measures gamma radiation in rad in the 200 to 600 rad range, utilizing a luminescence principle of operation, and is accurate to plus or minus 20 percent. A CP-95 A/PD Computer-Indicator is required to read the DT-60/PD, and once used, the dosimeter is disposed. The CP-95 A/PD runs on 115 volt AC only, and operates by focusing a beam of ultra-violet light onto the crystal-detecting element of the DT-60-PD, measuring the resulting orange light which is given off.

D. DECONTAMINATION EQUIPMENT

Marine Corps T/E's provide items of NBC defense equipment and material capable of handling first and second echelon decontamination.

1. First Echelon Decontamination

This is decontamination held by the individual on himself and his personal gear, and possibly on his assigned equipment.

a. Biological Decontamination Equipment

The field protective mask, immunization programs, and the practice of good area sanitation and personal hygiene provide the only individual protection available against biological agents. Soap and water are used, either at a personnel decontamination station (PDS) or on an individual basis, to remove biological agents from the skin, equipment, and gear.

b. Chemical Decontamination Equipment

The following items are available for individual decontamination:

(1) M13 Decontaminating and Reimpregnating Kit.

The Chloromide powder contained in the two bags provided are the active decontaminating ingredient of this previously described kit.

(2) M5 Vesicant Agent Protective Ointment.

Although replaced by the M13 kit, numerous issues of M5 kits are still available for use by many FMF units. Three tubes of ointment provide a neutralizing capability against mustard and V agents. It can be used by direct application to the

skin before exposure as a protective ointment or is applied after exposure as a decontaminant.

(3) Water. Flushing the eyes or skin with water, or water and soap, if available, will assist in removing most chemical agents, as well as dilute the agent to a less effective state.

c. Nuclear Decontamination Equipment

The two methods available to the individual in reducing or eliminating nuclear contamination are:

(1) Brushing. Removal of dry, loosely-held particles using brushes, brooms, or any convenient equipment from the skin or clothing. This will reduce, but not totally eliminate, existing contamination; in effect, it only moves the radioactive material to another location.

(2) Water. Water, particularly when hot and used in conjunction with soap, will reduce contamination, employing the physical movement of the contamination by the force of the water and the movement of soluble isotopes in solution. Once again, waste control must be contained. The use of a personnel decontamination station (PDS) or the individual removal of radioactive materials with water is the most effective method of personnel decontamination.

2. Second Echelon Decontamination

Second echelon decontamination is decontamination performed by unit Decontamination Team personnel under supervision of trained NBC defense personnel, using T/E equipment and material held by the unit.

a. Decontamination Team NBC Defense Equipment

In addition to the detection and identification equipment previously described, Decontamination Team members are provided with the following specialized items of clothing and equipment:

(1) CBR M9A1 Mask. This mask provides rapid cannister removal and replacement for continuous work within a toxic environment. It is provided with a waterproofing bag, cannister, carrier and anti-dim cloth.

(2) M3 Toxicological Agents Protective Suit (Mask, Hood, Coveralls, and Gloves). The M3 impermeable protective clothing does not allow passage of air through its butyl coated fabric, and is intended primarily for protection of personnel engaged in extremely hazardous decontamination work or in other special operations involving spillage or splashes of liquid chemical agents. It is sufficiently durable to withstand normal use and decontamination in the field. Liquid contamination should be either neutralized or removed from the clothing immediately as penetration is possible.

(3) Covers, Boot, Toxicological Agents Protective. Boot covers are worn over all boots except butyl rubber boots; in areas of gross contamination, boot covers will be worn over butyl rubber boots also.

(4) Boots, Knee, Heavy Butyl Rubber.

(5) Suit, Cooling, Toxicological Agent Protective (with Hood Cooling Cover). This suit and cover are worn over the M3 impermeable clothing under conditions

of warm weather. The cooling suit is kept moist, normally by spraying of water, to provide evaporative cooling for the wearer.

(6) Repair Kit, Toxicological Agents. This kit is similar to an automobile tube repair kit and is used to repair small holes and tears in the M3 impermeable clothing.

(7) Type II (General Supply) Equipment. Type II equipment is provided as dictated by each unit's assigned mission. Common Type II items for Decontamination Team use are:

Long handle shovels	Engineer and masking tape
Scrub brushes	Rags
Iron rakes	6-quart pails
Brooms	16- and 32-gallon cans with covers
Buckets	Detergent
Chalk and grease pencils	Immersion heater

(8) ABC-M11 Decontamination Apparatus. The ABC-M11 is a 1-1/2 quart, portable decontaminating apparatus. This unit is charged by a nitrogen gas cylinder, and uses DS-2 as its active decontaminating agent. Filled, it possesses a 135 square foot spray coverage area. It is used primarily to decontaminate vehicles, and upon application of the DS-2, the spray is allowed to set for 30 minutes, and is then flushed with water.

(9) M12A1 Power-Driven Decontamination Apparatus (PDDA). The M12A1 consists of a tank unit, a personnel shower assembly, a pump and hose unit, and an M2 water heater. It may be either mounted on an M35A2 truck for portable use or left skid-mounted for permanent or semi-permanent decontamination use. Used in conjunction with

a large 500-gallon capacity mixing tank, it can be used to spray super tropical bleach (STB) slurry to decontaminate large equipment, and provides a decontamination capability on a scale much larger than available using unit Decontamination Teams. It may also be used to provide a 24-man shower facility for PDS use. A crew of four Marines is required for proper operation.

3. NBC Decontamination

A decontaminant is any material that is used to remove, absorb, make harmless, or destroy contamination. Department of the Army Technical Manual 3-220 provides complete instructions and information on all NBC decontamination and decontaminants.

a. Biological Agent Decontamination

Individuals involved in biological decontamination operations must wear an FPM and protective clothing. Normal PDS procedures are followed upon completion of the decontamination. The following type of decontaminants are available.

(1) Natural Decontaminants:

(a) Weather. Low humidity dessicates and direct infrared and ultraviolet rays from the sun will kill most biological agents within one day.

(b) Water. Water flushes biological agents from the surface of materials. Washing with soap and boiling are two effective ways of eliminating biological agents.

(c) Earth. Earth can be used to cover or bury biological contamination. Either hand equipment and tools

or mechanical devices may be used to cover biological contamination.

(d) Fire and Dry Heat. Fire and dry heat will both effectively eliminate a biological contaminant. Pressure heating will increase the effectiveness of dry heating; temperatures to 335°F. for two to three hours will totally eliminate any biological contamination on equipment.

(2) Chemical Decontaminants. The following chemicals are applied as vapors:

(a) Decontaminating Agent, Biological, BPL (Beta-Propiol acetone). This is the standard agent for decontamination of the interior of buildings. It is applied with any spray apparatus as a vapor. Contact for a two (2) hour period is required at 70°F. or above; the exposure time must be doubled for each 18° Fahrenheit below 70°F. Aeration is required for 4 to 24 hours following decontamination.

(b) Formaldehyde Solution, U.S.P. (Formalin). Formalin is used as a field expedient when BPL is not available. One quart is sprayed per 1000 cubic feet of space. Vapors should be allowed to stand for up to 16 hours and followed by a minimum 24-hour aeration period.

(c) Ethylene Oxide (ETO). This is a highly penetrating vapor used on the basis of 30 pounds of ETO for each 1000 cubic feet at 75° Fahrenheit for a period of six to eight hours. Either the amount of ETO or the contact time must be doubled for each 20°F. drop in temperature. Due to its explosive characteristics, ETO is not used for

decontamination of building interiors. Clothing decontaminated with ETO must be aerated for 18 to 24 hours before wearing.

(d) Carboxide. This is a mixture of ETO and carbon dioxide. It is less effective than ETO and must be used for twice the time of ETO. Its primary use is in decontamination of building interiors.

(e) Methyl Bromide. Methyl bromide is issued in ampule form and five ampules are required per delousing bag for a minimum of 12 hours. Decontaminated items must be aerated for two hours following decontamination. It is normally used when ETO is not available and is especially useful for decontaminating leather and woolen items.

(f) Peracetic Acid (PAA). PAA is used against bacteriological spores. Use of a 3% solution is effective in decontaminating the skin; a 5 to 10 minute contact time is sufficient. PAA provides an effective and safe solution for FPM decontamination. PAA is highly volatile (105° Fahrenheit flash point) and requires careful handling.

b. Chemical Agent Decontamination

There are two standard chemical agent decontaminants which are effective not only in use against chemical agents, but also against biological agents. Both are included in the following classification.

(1) Standard Decontaminants:

(a) Super Tropical Bleach (STB). STB is a chlorinated lime and calcium oxide white powder containing approximately 30% available chlorine. It destroys mustards,

arsenicals, and V and G nerve agents by converting them to harmless or less toxic compounds. STB can be used in a dry mix (with soil) to decontaminate terrain or as a slurry to decontaminate wood, rubber, roadways, and concrete. Care must be taken with its use as it will corrode metals and cannot be used for personnel decontamination. It can be applied either manually or with a decontaminating apparatus, but requires the wearing of protective gloves and FPM.

(b) DS-2. DS-2 is a clear, amber solution consisting of 70% active agent, 28% solvent, and 2% active agent booster. It is a general purpose, standard decontaminating agent which works on all known chemical agents and most biological agents within 30 minutes. It is non-corrosive to most metals, but softens leather, softens or removes old paint, and may discolor new paint. It is flammable and is a skin irritant, and is poisonous to breathe. It cannot be used to decontaminate personnel or masks, and cannot be used with or mixed with STB because a fire may result.

(2) Miscellaneous Decontaminants. There are a number of chemicals and chemical products which have been authorized for purposes other than decontamination but which are suitable as decontaminants.

(a) Caustic Soda (Lye). Lye is used in a 5% solution for G and L agents.

(b) Sodium Hypochlorite (Household Bleach). This is used full strength for H & V agents.

(c) Sodium Carbonate (Washing Soda). This is used for G agents only.

(d) Organic and Degreasing Solvents. These are solvents used for removal of chemical agents only.

Often absorbants, explosives, and heat are considered as miscellaneous decontaminants, as their use vaporizes and clears chemical agent contamination, but they are rarely used specifically for decontamination purposes.

(3) Natural Decontaminants:

(a) Weather. Evaporation and decomposition are the principal means by which the elements of weather (air, sunlight, humidity, and temperature) gradually accomplish decontamination. It is the simplest of all methods and is utilized whenever possible.

(b) Water. Flowing water or steam flushes chemical agents from surfaces and also hydrolyzes some agents. Hot water is generally more effective than cold and the addition of soap produces an even more effective decontaminant.

(c) Earth. Earth is used to seal in contamination or as an absorbant for liquid contamination. Covering an affected area with 10 centimeters of earth provides protection as long as the earth is not disturbed and the chemical agent re-exposed.

(d) Fire. Fire destroys or vaporizes liquid chemical agents. Fire is a rapid, simple, and effective means of decontaminating terrain or other noncombustible material.

(e) Hot Air. Hot air is used in the decontamination of liquid agents from the delicate instruments of aircraft, as it evaporates liquid contaminants readily and safely.

c. Nuclear and Radiological Decontamination

Nuclear and radiological decontamination is the process of moving radioactive material from an uncontrolled location to a controlled location. This contamination is comprised of particles of dirt or water drops that contain radioactive materials and which provide a threat to personnel; this radioactive material must be removed to such a degree that the contaminated area or object is safe or the hazard is minimized. Radioactivity must be removed because it cannot be neutralized or destroyed. Potential sources of radioactive contamination are residual radiation (induced radiation and fallout) from nuclear weapon detonation, the deliberate use of radioactive material (radiological agents), release from a radioactive source, nuclear accidents, or a nuclear reactor excursion. The three methods of decontaminating these potential sources of radiation are:

(1) Aging. This is the simplest and most practical procedure as it reduces the radiation dose to personnel and requires the least man-hour effort. In practice, it actually consists of placing a contaminated object in an out-of-way area, posting the area with the appropriate decontamination markers and waiting for the radiation to decay to an acceptable level. This process is periodically checked with radiac instruments. The time required is a function of the isotope(s) present and its (their) decay rate(s).

(2) Sealing. Sealing is the process of covering radiological contamination with a substance which reduces or

shields the radiation being emitted and/or fixes the contamination in place. Gamma radiation may thus be attenuated and the emitters fixed in place. The equipment used in sealing operations will become contaminated and should be decontaminated or disposed of as appropriate. Common sealants are:

(a) Earth. Earth is a temporary sealant applied over the contaminant in a layer at least 30 centimeters thick; eight centimeters will reduce the dose rate by approximately one-half. The operation is most readily accomplished with earth-moving equipment but shovels may be used if the contaminated area is small or other equipment is not available.

(b) Asphalt and Concrete. Application of three centimeters of asphalt or concrete can be applied as a permanent sealant over roadways or limited land areas; this process requires the use of road-surfacing equipment and is relatively expensive.

(c) Grout. Grout is a thin mixture of sand, cement, and water which is applied over concrete or masonry surfaces through a spray process or by trowel, rake, or other expedient tool. A 0.5 centimeter layer is a temporary seal for all emitters and will shield alpha and beta radiation.

(d) Paint, Varnish, and Plastic. These materials may be used to seal contamination on or in wood, concrete, masonry, and metals. They are applied by brush only, and seal all emitters, but offer only minute attenuation of gamma radiation.

(3) Removal. The moving of radiological contamination from areas, food, personnel, water, or equipment to another location where the contamination will not pose a hazard is termed removal. Removal requires more time and effort than either aging or sealing, and is divided into two categories:

(a) Dry Methods. Removal procedures using dry methods of removal depend upon the removal of isotopes in the same physical and chemical state as that in which they exist as contaminants. Brushing, vacuuming, abrasion, taping, earth moving, and stripping and replacing are the common dry methods used.

(b) Wet Methods. Removal procedures depend upon the removal of radio isotopes either in the same physical and chemical state in which they exist as contaminants, making use of the erosive action of water, or in a physical or chemical state that is different from that in which they exist as a contaminant, making use of a chemical action between the contaminant and the decontaminant. The use of water, steam-cleaning, scrubbing, complexing agents, organic solvents, caustics, acids, and pastes are all wet methods of decontamination.

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